

**DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY**



**CIRCULAR NO.SU/B.Sc./08/2022**

It is hereby inform to all concerned that, the syllabi prepared by the Board of Studies and Ad-hoc Boards with recommendation of the Dean, Faculty of Science & Technology, the Hon'ble Vice-Chancellor has accepted the **following syllabi of Bachelor of Science with Regulation under the scheme of Choice Based Credit & Grading System** in his emergency powers under section 12(7) of the Maharashtra Public Universities Act, 2016 on behalf of the Academic Council as appended herewith.

Sr.No.	Courses	Semester
1.	<b>B.Sc.Electronics(Optional)</b>	<b>Ist and IInd semester (First Year)</b>
2.	<b>B.A./B.Sc.Mathematics(Optional)</b>	<b>Ist and IInd semester (First Year)</b>
3.	<b>B.Sc.Chemistry(Optional)</b>	<b>Ist and IInd semester (First Year)</b>
4.	<b>B.Sc.Physics(Optional)</b>	<b>Ist and IInd semester (First Year)</b>
5.	<b>B.Sc.Analytical Chemistry</b>	<b>Ist and IInd semester (First Year)</b>
6.	<b>B.Sc.Geology (Optional)</b>	<b>Ist to VIth semester (First to Third)</b>

This is effective from the Academic Year 2022-23 and onwards.

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,  
Aurangabad-431 004.

REF.NO.SU/2022/ 6852-62

Date:- 10.08.2022.

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*[Signature]*  
**Deputy Registrar,  
Academic Section**

**Copy forwarded with compliments to :-**

- 1] **The Principal of all concerned Colleges,**  
Dr. Babasaheb Ambedkar Marathwada University,
- 2] **The Director, University Network & Information Centre, UNIC, with a request to upload this Circular on University Website.**

**Copy to :-**

- 1] **The Director, Board of Examinations & Evaluation, Dr.BAMU,A'bad.**
- 2] The Section Officer,[B.Sc.Unit] Examination Branch,Dr.BAMU,A'bad.
- 3] The Programmer [Computer Unit-1] Examinations, Dr.BAMU,A'bad.
- 4] The Programmer [Computer Unit-2] Examinations, Dr.BAMU,A'bad.
- 5] The In-charge,[E-Suvidha Kendra], Rajarshi Shahu Maharaj Pariksha Bhavan, Dr.BAMU,A'bad.
- 6] The Public Relation Officer, Dr.BAMU,A'bad.
- 7] The Record Keeper, Dr.BAMU,A'bad.

**Dr. Babasaheb Ambedkar Marathwada University  
Aurangabad**



**Physics Syllabus**

**Choice Based Credit System**

**B.Sc. F.Y.**

**Semester I & II**

**Effective From**

**Academic Year 2022-23**

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

Dean

Faculty of Science & Technology  
Dr. Babasaheb Ambedkar Marathwada  
University, Aurangabad

**B. Sc. I Year Physics Syllabus**  
**Choice Based Credit System Syllabus**  
**To be implemented from Academic Year 2022-2023**

**Title of the Course: B.Sc. (Physics)**

**Preamble:**

The curriculum for the B. Sc. (Physics) programme is designed to cater to the requirement of Choice Based Credit System following the University Grants Commission (UGC) guidelines. In the proposed structure, due consideration is given to Core and Elective Courses (Discipline specific - Physics), along with Ability Enhancement (Compulsory and Skill based) Courses. Furthermore, continuous assessment is an integral part of the CBCS, which will facilitate systematic and thorough learning towards better understanding of the subject. The systematic and planned curricula from first year to the third year (comprised of six semesters) shall motivate the student for pursuing higher studies in Physics and inculcate enough skills for becoming an entrepreneur.

**Objectives:**

- To foster scientific attitude, provide in-depth knowledge of scientific and technological concepts of Physics.
- To enrich knowledge through problem solving, minor/major projects, seminars, tutorials, review of research articles/papers, participation in scientific events, study visits, etc.
- To familiarize with recent scientific and technological developments
- To create foundation for research and development in Physics.
- To help students to learn various experimental and computational tools thereby developing analytical abilities to address real world problems.
- To train students in skills related to research, education, industry, and market.
- To help students to build-up a progressive and successful career in Physics.

**Structure of the Course:**

Subject Name	Year	Semester	Course Type	Course Code	Course Name	Credit
Physics	1	I	Compulsory Course	PHY-111	Mechanics and Properties of Matter	2
				PHY-112	Heat and Thermodynamics	2
				PHY-121	Lab Course - I	1.5
		II	Compulsory Course	PHY-211	Geometrical and Physical Optics	2
				PHY-212	Electricity and Magnetism	2
				PHY-221	Lab Course - II	1.5

  
 5/08/22  
 Dean  
 Faculty of Science & Technology  
 Dr. Babasaheb Ambedkar Marathwada  
 University, Aurangabad

### **Learning Outcomes:**

On successful completion of this course students will be able to:

1. Understand Newton's laws and apply them in calculations of the motion of simple systems.
2. Use the free body diagrams to analyze the forces on the object.
3. Understand the concepts of friction and the concepts of elasticity, fluid mechanics and be able to perform calculations using them.
4. Apply the laws of thermodynamics to formulate the relations necessary to analyze a thermodynamic process.
5. Demonstrate quantitative problem solving skills in all the topics covered



( S.Chand , 7 th edition )

- 4) Concepts of Physics: H. C. Verma, BharatiBhavan Publisher.
- 5) University Physics : Sears and Zeemansky, XIth/XIIth Edition, Pearson Education.

**B. Sc. I Year Physics (Semester-I)**  
**(Heat and Thermodynamics)**  
**Course Code – Phy112**                      **Paper – II**

**Periods – 45**

**Marks – 50**

**1) Thermometry and Thermal Conductivity:**

**10 periods**

Types of thermometers, Principle of thermometry, centigrade and Fahrenheit scale, Transference of heat, Coefficient of thermal conductivity, Rectilinear flow of heat along a metal bar, Methods of radial flow of heat-(i)spherical shell method and (ii)Flow of heat along the wall of a cylindrical tube, comparison of conductivities of different metals.

**2) Real Gases**

**10 periods**

Introduction, Equation of state Reason for modification of gas equation, Van der Waals equation of state , Zeroth law of thermodynamics, comparison with experimental curves, critical constants, constants of Van der Waals equation.

**3) Transport phenomena–**

**12 periods**

Introduction, Mean free path, sphere of influence, and expression for mean free path, variation of mean free path with temperature and pressure, transport phenomena, viscosity, Thermal conductivity (their interrelationship, dependence on temperature and pressure).

**4) Thermodynamics: -**

**13 periods**

Adiabatic process, Adiabatic equation of a perfect gas, Isothermal process, Indicator diagram, work done during isothermal process and adiabatic process, reversible and irreversible process, Second law of thermodynamics. (Kelvin and Clausius statement), Heat engines, Carnot's ideal heat engine, Carnot's cycle (work done and Efficiency).

**Reference Books:-**

- 1) Heat Thermodynamics and Statistical Physics - Brijlal, N.Subrahmanyam , P.S. Heme ( S.Chand , 2007 Edition ) .
- 2) Text Book of Heat and Thermodynamics–J. B. Rajam, C.L. Arora (S. Chand, 9th Edition)
- 3) Heat and Thermodynamics– S. S. Singhal, J. P. Agarwala, S.Prakash (Pragati Prakashan)
- 4) Thermodynamics & Statistical physics-S. L. Kakani



**B. Sc. I Semester**  
**Physics paper III (Phy113)**  
**List of experiment**

1. Study and use of various measuring Instruments
  1. Vernier caliper 2. Micrometer Screw Gauge 3. Travelling Microscope
  4. Spherometer 5. Spectrometer information about source and their wavelengths.
2. Determination of acceleration due to gravity by Kater's pendulum
3. Y by bending of a beam loaded at center.
4. Determination of Y by Cantilever (Oscillation method)
5.  $\eta$  by Maxwell's needle.
6. Determination of "Y" and " $\eta$ " by flat spiral spring.
7. Viscosity measurement by Poiseuille's method.
8. S.I. by Jaeger's method.
9. Study of Solar constant.
10. Study of thermal conductivity by Lee's method

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

### **Learning Outcomes:**

On successful completion of this course learner will be able to.....

1. Understand the concepts of Physical and Geometrical optics.
2. Familiarize with optical instruments and lens aberrations.
3. Comprehend interference and diffraction of light.
4. Understand polarization of light.
5. Know the concepts of the electric force, electric field and electric potential for stationary charges.
6. Able to calculate electrostatic field and potential of charge distributions using Coulomb's law and Gauss's law.
7. Understand the dielectric phenomenon and effect of electric field on dielectric.
8. Learn magnetic field for steady currents using Biot-Savart and Ampere's Circuital laws.
9. Study magnetic materials and its properties.
10. Demonstrate quantitative problem-solving skills in all the topics covered.

**B. Sc. I Year Physics (Semester-II)**  
**(Geometrical and Physical Optics)**  
**Course Code – PHY-211**  
**Paper – IV**

**Periods – 45**

**Marks – 50**

**1) Optical system and Cardinal points: -**

**10 periods**

Conjugate points, planes and distances, Lateral magnification, Longitudinal magnification and Angular magnification, Cardinal points of optical system - Focal points, Principal points, Nodal points and corresponding planes, coaxial lens system - equivalent focal length and cardinal points.

**2) Optical instruments: -**

**12 periods**

Lens Aberrations - Monochromatic and Chromatic, Field of view, Stops and pupils, Objective and eyepiece, Need of multiple lens eye piece, Huygens's Eyepiece, Ramsden's eyepiece.

**3) Interference and Diffraction: -**

**12 periods**

**Interference:** Newton's rings, Determination of wavelength of sodium light, Michelson's Interferometer - Idea of form of fringes (No theory required), determination of wavelength and difference in wavelength.

**Diffraction:** Types of diffraction, Fraunhofer diffraction due to single and double slit, Plane diffraction grating, Determination of wavelength by plane diffraction grating (Normal incidence), Rayleigh's criterion for resolution, Resolving power of telescope and grating.

**4) Polarization: -**

**11 periods**

Polarized and unpolarized light, Malus law, Brewster's law, Double refraction, Huygens's theory of double refraction in uniaxial crystal, Nicol prism, Optical activity, Fresnel's explanation of optical rotation, specific Rotation, Laurentz's half shade polarimeter.

**Reference Books:-**

- 1) Fundamentals of Optics, F.A. Jenkins and H.E. White, 1981, McGraw-Hill
- 2) A text book of optics- Brijlal and Subrahmanyam(S.Chand & Co.)
- 3) Optics and Spectroscopy - R.Murugesan, K.Sivaprasath(S.Chand, 7th Revised Edition)

- 4) Optics(Second Edition) - A.K.Ghatak
- 5) Geometrical & Physical Optics - D.S.Mathur
- 6) Optics and Atomic Physics- D.P.Khandelwal (Himalaya Publishing House)
- 7) Geometrical and Physical Optics, P K Chakraborty, New Central Book Agency

**B. Sc. I Year Physics (Semester-II)**  
**Course Code – PHY-212 (Electricity and Magnetism)**

**Paper – V**

**Periods – 45**

**Marks – 50**

**1. Vector Algebra: -**

**15 periods**

Scalar and vector product, scalar triple product and its geometrical interpretation, vector triple product, gradient, divergence and curl and its physical interpretation, line, surface and volume integrals, Gauss divergence theorem and Stoke's theorem.

**2. Electrostatics: -**

**10 periods**

Coulomb's Law, Electric field, field due to a point charge, flux of electric field, Gauss's law (with proof), Differential form of Gauss law, electric potential, potential due to a point charge, Potential and field due to electric dipole.

**3. Dielectrics: -**

**08 periods**

Dielectric, polar and non-polar molecules, dielectric polarization, Gauss's law in dielectrics, Relation between D, E and P, molecular field in a dielectric (Clausius-Mossotti relation).

**4. Magnetostatics: -**

**12 periods**

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

**References:**

1. Mathematical Methods in Physics- D. Biswas (New central book agency, 2009 edition).
2. Electricity and Magnetism- R. Murugesan (S. Chand, 2008 edition).
3. Electrodynamics- Gupta, Kumar, Singh (Pragati Prakashan, Meerut, 18<sup>th</sup> edition, 2005)

4. Foundations of Electromagnetic theory- Reitz, Milford, Chirstey III<sup>rd</sup> edition.
5. Fundamentals of Physics- Halliday Resnik and Walkar, 8<sup>th</sup> Edition.
6. Electromagnetics- B. B. Laud.
7. Electricity and Magnetism- BrijLal, Subramanyan, RatanPrakashan (Revised edition, 1997).
8. Electricity and Magnetism- Edward M. Purcell, 1986, McGraw-Hill Education.
9. Electricity and Magnetism- D C Tayal, 1988, Himalaya Publishing House.

**B. Sc. II Semester**  
**Physics paper VI (PHY-221)**  
**List of experiment**

1. Use of multimeter for measuring voltage, current and resistance.
2. Determination of dielectric constant of liquid / solid.
3. I-H curve.
4. Field along the axis of circular coil.
5. Determination of wavelength of light by Newton's rings.
6. Resolving power of telescope.
7. Specific rotation by Laurent's half shade polarimeter.
8.  $\lambda$  by grating (normal incidence)
9. Determination of frequency of AC mains by sonometer
10. Comparison of capacitor using De'Sauty's method
11. Measurement of constants of B. G.

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

**PHYSICS**

**Time: 2.30 Hours**

**[Max. Marks: 50]**

**NOTE:** 1. All Questions carry equal marks  
2. Use of logarithmic table and electronic pocket calculator is allowed.

Q1 Chapt.I (Long question) 10 marks

OR

Chapt.II (Long question)

Q2 Chapt.III (Long question) 10 marks

OR

Chapt.IV (Long question)

Q3 a) Chapt. I (short question) 10 marks  
b) Chapt. II (short question)

OR

a) Chapt.III (short question)  
b) Chapt.IV (short question)

Q4. Attempt any two 10 marks

- a) Chapter I Problem
- b) Chapter II Problem
- c) Chapter III Problem
- d) Chapter IV Problem

Q 5 MCQ 10 marks

Ten MCQ's having four alternatives based on theory and numerical.  
(Minimum two MCQ's from each chapter)



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Faculty of Science & Technology  
Dr. Babasaheb Ambedkar Marathwada  
University, Aurangabad





[17]	B.Sc. Biotechnology (Opt.) (Progressively)	Semester-I to IV,
[18]	B.Sc. Sericulture Technology	Semester-I & II,
[19]	B.Sc. Networking Multimedia	Semester-III & IV,
[20]	B.Sc. Bioinformatics	Semester-I & II,
[21]	B.Sc. Hardware & Networking	Semester-I & II,
[22]	B.Sc. Animation	Semester-I & II,
[23]	B.Sc. Dairy Science & Technology	Semester-III & IV,
[24]	B.Sc. Biochemistry	Semester-III & IV,
[25]	B.Sc. Analytical Chemistry	Semester-III & IV,
[26]	B.Sc. Textile & Int. Decoration with minor changes	Semester-I & II,
[27]	B.Sc. Textile & Int. Decoration	Semester-III & IV,
[28]	B.Sc. Home Science with minor changes	Semester-I & II,
[29]	B.Sc. Home Science	Semester-III & IV,
[30]	B.Sc. Agro.Chem. & Fertilizers	Semester-III & IV,

S-29 Nov., 2013 AC after Circulars from Circular No.55 &amp; onwards

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[31]	<b>B.Sc. Geology</b>	<b>Semester-III &amp; IV,</b>
[32]	<b>B.A. Statistics with minor changes</b>	<b>Semester-I &amp; II,</b>
[33]	<b>B.A. Statistics</b>	<b>Semester-III &amp; IV,</b>
[34]	<b>B.Sc. Statistics with minor changes</b>	<b>Semester-I &amp; II,</b>
[35]	<b>B.Sc. Statistics</b>	<b>Semester-III &amp; IV,</b>
[36]	<b>B.Sc. Industrial Chemistry</b>	<b>Semester-III &amp; IV,</b>
[37]	<b>B.Sc. Horticultural</b>	<b>Semester-I &amp; II,</b>
[38]	<b>B.Sc. Dry land Agriculture</b>	<b>Semester-I &amp; II,</b>
[39]	<b>B.Sc. Microbiology</b>	<b>Semester-III &amp; IV,</b>
[40]	<b>M.Sc. Computer Science</b>	<b>Semester-I to IV,</b>
[41]	<b>M.Sc. Information Technology</b>	<b>Semester-I to IV.</b>

हा सुधारीत व नवीन तयार केलेल्या अभ्यासक्रमाचा आराखडा शैक्षणिक वर्ष २०१४-१५ करिता मर्यादित असेल व विद्यापरिषदेच्या अंतिम मान्यतेनंतर हे परिपत्रक नियमित ठेवण्याबाबत या कार्यालयाद्वारे नवीन परिपत्रक पारीत करण्यात येईल. तसेच सुधारीत व नवीन तयार केलेल्या अभ्यासक्रमाची प्रत विद्यापीठाच्या संकेतस्थळावर उपलब्ध आहे.

करिता, या परिपत्रकाची सर्व संबंधितांनी नोंद घ्यावी.

विद्यापीठ प्रांगण,  
औरंगाबाद-४३१ ००४.  
संदर्भ क्र.एस.यु./सा.शा./सबवि /२०१३-१४/  
६५९९-७०२  
दिनांक :- २७-०५-२०१४.

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संचालक,  
महाविद्यालये व विद्यापीठ  
विकास मंडळ.

या परिपत्रकाची एक प्रत :-

- १) मा. परिक्षा नियंत्रक, परिक्षा विभाग,
  - २) मा. प्राचार्य, सर्व संलग्नीत महाविद्यालये,
  - ३) संचालक, युनिक यांना विनंती करण्यात येते की, सदरील अभ्यासक्रम विद्यापीठाच्या संकेतस्थळावर उपलब्ध करुण देण्यात यावेत.
  - ४) संचालक, ई-सुविधा केंद्र, विद्यापीठ परिसर,
  - ५) जनसंपर्क अधिकारी, मुख्य प्रशासकीय इमारत,
  - ६) कक्ष अधिकारी, पात्रता विभाग, मुख्य प्रशासकीय इमारत,
  - ७) कक्ष अधिकारी, बी.ए. / बी.एस्सी./ बी.सी.एस./एम.एस्सी. विभाग, परीक्षा भवन,
  - ८) अभिलेख विभाग, मुख्य प्रशासकीय इमारती मागे,
- डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद .

**Dr. Babasaheb Ambedkar Marathawada University  
Aurangabad**



**Revised Syllabus of Physics**

**Optional**

**B.Sc. II Year**

**Semester III & IV**

**Effective for Academic Year 2014-15**

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.****B.Sc. II<sup>nd</sup> year Physics Syllabus****(Semester-III and IV)****Revised Syllabus from June 2014**

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

**Scheme of Practical Examination and marks**

**Practical Examination will be conducted annually**

**Practical Paper IX + X based on theory Paper VII & VIII (50 + 50 = 100 Marks)**

**Practical Paper XIII + XIV based on theory paper XI & XII (50 + 50 = 100 Marks)**

**Experiment– 75 marks + Viva-Voce 15 marks + Record Book/ Journals 10 marks= 100 marks**

**B.Sc. II<sup>nd</sup> 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, and 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  $g_i$ ,  $\alpha$  and  $\beta$ , M.B. distribution function for ideal gas, M.B. Speed distribution law.

**3. Quantum statistics:**

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 static, 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<sup>nd</sup> year Physics (Semester-III)**  
**(Modern and Nuclear Physics)**  
**Course code PHY-202**  
**Paper-VIII**

**Period-45**

**Marks-50**

**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's X-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. Modern Physics-J. B. Rajan
2. Modern Physics- R. Murugesan, Er.Kirutyhiga, Sivaprasath. S. Chand Publication
3. Nuclear Physics- Kaplan
4. Nuclear Physics- B.N. Srivastava
5. Atomic and nuclear physics-N. Subramanyan and Brijlal.

**B.Sc. II<sup>nd</sup> 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  $B_H$  and  $B_V$  using Earth Inductor
4. Stefan's constant by using thermo couple
5. Measurement of low resistance using potentiometer.
6. Frequency 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. II<sup>nd</sup> 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/microscope.
8. Determination of Wavelength of light by Newton's ring

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

**B.Sc. II<sup>nd</sup> 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, Zener diode, Zener diode characteristics, Transistor (PNP and NPN), Transistors characteristics (CE, CB and CC), Construction, Working and Characteristics of FET & MOSFET.

**2. Transistor Biasing and Amplifiers :**

Transistor biasing, Selection of operating point, 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. Oscillators and 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 multivibrator, bistable Multivibrator,

**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<sup>nd</sup> 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), lattice directions and planes, Miller indices, Inter planer spacing, simple crystal structure.

**2. Bonding and Band theory of solids :**

Introduction, concept of inters-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 – Pragati prakashan, Meerat
4. Solid State Physics, Revised VI<sup>th</sup> Editions, S.O. Pallai.
5. Introduction to Solid State Physics, VII<sup>th</sup> Edition, C. Kittel.

**B.Sc. II<sup>nd</sup> 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  $\Pi$  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.

**B.Sc. II<sup>nd</sup> 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/subtractor
- 7 JFET characteristics. ( $r_p$ ,  $g_m$  and  $\mu$ )
8. Self-inductance by Owen's Bridge

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

**Additional activity**

- 1. Organize study tour industrial/research institute**
- 2. Conduct Seminars**

**QUESTION PAPER PATTERN**

**B.Sc. S.Y. (III & IV Semester)**

**PHYSICS**

**Time: 2.00 Hours**

**[Max. Marks: 50]**

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*NOTE 1. All Questions carry equal marks*

*2. Use of logarithmic table and electronic pocket calculator is allowed.*

*Q1 Chapt.I (Long question) 10marks*

*OR*

*Chapt.II (Long question)*

*Q2 Chapt.III (Long question) 10 marks*

*OR*

*Chapt.IV (Long question)*

*Q3 Attempt following 10 marks*

*a) Chapt. I (short question)*

*b) Chapt. II (short question)*

*Or*

*a) Chapt. III (short question) 10 marks*

*b) Chapt. IV (short question)*

*Q4 Attempt any two 10 marks*

*a) Chapter I Problem*

*b) Chapter II Problem*

*c) Chapter III Problem*

*d) Chapter IV Problem*

*Q. 5 MCQ 10 marks*

*Ten MCQ's having four alternatives based on theory and numerical.*

*(Minimum two MCQ's from each chapter)*

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S-30th May, 2015 AC after Circulars from Circular No.1 &amp; onwards - 6 -

**DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY****CIRCULAR NO.ACAD/SU/Sci./B.Sc. & M.Sc. Syll./5/2015**

It is hereby notified for information to all the concerned that, on the recommendation of the Faculty of Science the Academic Council at its meeting held on 30-05-2015 has accepted the **revised semester-wise syllabi as mentioned against their names in the Faculty of Science as under :-**

Sr. No.	Name of the Subject	Semester
[1]	B.Sc. Computer Science Degree Course	III & IV
[2]	B.Sc. Information Technology Degree Course	III & IV
[3]	B.C.A. Science Degree Course	III & IV
[4]	B.Sc. Animation Degree Course	III & IV
[5]	B.Sc. Bioinformatics Degree Course	III & IV
[6]	B.Sc. Computer Science [Optional]	III & IV
[7]	B.Sc. Information Technology [Optional]	III & IV
[8]	B.Sc. Computer Applications [Optional]	III & IV
[9]	B.Sc. Computer Maintenance [Optional]	III & IV
[10]	B.Sc. Environmental Science [Optional]	V & VI
[11]	B.Sc. Bio-Chemistry [Optional]	V & VI
[12]	B.Sc. Forensic Science Degree Course	V & VI
[13]	B.Sc. Industrial Chemistry [Optional]	V & VI
[14]	B.Sc. Electronics [Optional]	V & VI
[15]	B.Sc. Zoology [Optional]	V & VI
[16]	B.Sc. Microbiology [Optional]	V & VI
[17]	B.Sc. Instrumentation Practice [Optional]	V & VI
[18]	B.Sc. Statistics [Optional]	V & VI
[19]	B.A. Statistics [Optional]	V & VI
[20]	B.A. / B.Sc. Mathematics [Optional]	V & VI
[21]	B.Sc. Home Science Degree Course	V & VI
[22]	B.Sc. Textile Interior Decoration Degree Course	V & VI
[23]	B.Sc. Fishery Science [Optional]	V & VI
[24]	B.Sc. Dairy Science & Technology [Optional]	V & VI
[25]	B.Sc. Botany [Optional]	V & VI
[26]	B.Sc. Physics [Optional]	V & VI
[27]	M.Sc. Computer Science	III & IV
[28]	M.Sc. I.T.	III & IV

This is effective from the Academic Year 2015-16 & onwards as appended herewith.

All concerned are requested to note the contents of the circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,  
Aurangabad-431 004.  
REF.No.ACAD/SU/SCI./  
2015/3761-4160  
Date:- 16-06-2015.

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**Director,**  
**Board of College and**  
**University Development.**

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S-30th May, 2015 AC after Circulars from Circular No.1 & onwards - 7 -

**:: 2 ::**

**Copy forwarded with compliments to:-**

- 1] The Principals, affiliated concerned colleges,  
Dr. Babasaheb Ambedkar Marathwada University

**Copy to :-**

- 1] The Controller of Examinations,
- 2] The Director, [E-Suvidha Kendra], in-front of Registrar's Quarter,  
Dr. Babasaheb Ambedkar Marathwada University,
- 3] The Superintendent, [B.Sc. Unit],
- 4] The Superintendent, [M.Sc. Unit],
- 5] The Programmer [Computer Unit-1] Examinations,
- 6] The Programmer [Computer Unit-2] Examinations,
- 7] The Record Keeper.

**S\*/-160615/-**

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

**PHYSICS SYLLABUS**

**B. Sc. III Year**

**Semester V & VI**

**Effective from academic year 2015-16**

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.**  
**B. Sc. III<sup>rd</sup> year Physics Syllabus**  
**(Semester-V and VI)**  
**Revised syllabus from June 2015**

Semester	Course Code	Paper	Title of Paper	Periods	Marks
V	301	XV	Classical & Quantum Mechanics	45	50
V	302	XVI	Electrodynamics	45	50
V	303	XVII	Practical	45	50
V	304	XVIII	Practical	45	50
VI	305	XIX	Atomic, Molecular Physics & Laser	45	50
VI	306	XX	Non-conventional energy sources and Optical fiber	45	50
VI	307	XXI	Practical	45	50
VI	308	XXII	Practical	45	50

**Scheme of practical examination and marks**

Practical examination will be conducted annually

**Practical** : paper XVII+XVIII based on theory paper XV & XVI (50+50= 100 Marks)

**Practical** : paper XXI + XXII based on theory paper XIX & XX (50+50= 100 Marks)

**Experiment** : Paper XVII+XVIII – Experiment 75 marks + Viva-Voce 15 Marks + Record Book/Journals 10 Marks + = 100 Marks

**Experiment** : Paper XXI + XXII - Experiment 70 marks + Viva-Voce 10 Marks + Record Book/Journals 10 Marks + Submission of project report 10 Marks = 100 Marks

**B.Sc. III<sup>rd</sup> year Physics (Semester-V)**  
**Classical and Quantum Mechanics**  
**Course code PHY-301**  
**Paper-XV**

**Period-45**

**Marks-50**

**Chapter 1. Classical Mechanics**

**[11]**

Mechanics of Particle, Mechanics of system of particles Constraints, Classification of Constraints, Virtual Work, D'Alembert's principle, Lagrange's equation, Simple application of Lagrangian formulation –Simple Pendulum, Particle in space, Linear Harmonic Oscillator, Atwood's Machine .

**Chapter 2. Origin of Quantum theory**

**[12]**

Introduction, Failure of Classical mechanics, Black body Radiation (Distribution of Energy), Plank's Quantum theory-Plank's Quantum postulates, linear momentum of photon in terms of wave vector, Plank's radiation law-Wein's law and Rayleigh's law, Einstein's equation: Quantum theory of photoelectric effect, Quantum effect.

**Chapter 3. Wave Particle duality**

**[12]**

Introduction, de-Broglie's hypothesis for matter waves, de-Broglie's wavelength in terms of energy and temperature, de-Broglie phase velocity and particle velocity (relation between them), Group velocity, Relation between group velocity and phase velocity, Davisson-Germer Experiment, Heisenberg uncertainty principle, Applications of Heisenberg uncertainty principle (1) Nonexistence of electrons in nucleus (2) Binding energy of an electron in an atom.

**Chapter 3. The Schrodinger Equation and its applications**

**[10]**

Wave Function ( $\Psi$ ) of a moving particle, Time dependent Schrodinger's wave equation, Expectation value, Operators, Time independent Schrodinger equation (steady state form), particle in one dimensional box, Quantization of energy and momentum.

**Reference Books**

- 1) Classical Mechanics- H- Goldstein
- 2) Classical Mechanics – N.C. Rana and P.S. Joag
- 3) Classical Mechanics – Gupta, Kumar and Sharma
- 4) Introduction of Classical Mechanics – R.G. Takwale& P.S. Puranik.
- 5) Physics for degree student – C.L. Arora, P.S. Hemne (Ist edition S. Chand Publication).
- 6) Quantum Chemistry- Donald Allan Macquarie (Viva-Books Pvt. Ltd.).
- 7) Mathematics for Chemistry- Donald Allan Macquarie (Viva Books Pvt. Ltd.).
- 8) Concepts of Modern Physics - Arthur Beiser, ShobhitMahajan, S. RaiChoudhary (VI<sup>th</sup> Edition- Mc- Graw Hill).
- 9) Perspective of Modern Physics – Arthur Beiser.

**B.Sc. III<sup>rd</sup> year Physics (Semester-V)**

**Electrodynamics**

**Course code PHY-302**

**Paper-XVI**

**Period-45**

**Marks-50**

**Chapter 1. Electrostatics**

**[12]**

**Introduction :** Electric field lines , electric flux and Gauss law, the divergence of E, Curl of E, Application of Gauss law: i) Electric field due to a uniform charged sphere ii) Electric field due to charged cylinder, Gaussian pillbox, Poisson's equation, Laplace's equation, Uniqueness theorem ( First and Second)

**Chapter 2. Time varying field**

**[10]**

Faraday's Law of Electromagnetic induction, Lenz's law, Self-Induction, Mutual Induction, equation of continuity, Maxwell's displacement current, Maxwell's equation (Derivation, Differential form)

**Chapter 3. Electromagnetic waves III**

**[15]**

Origin of electromagnetic waves, characteristics of electromagnetic wave, electromagnetic wave equations in a conducting medium, transverse nature of electromagnetic wave, plane polarized electromagnetic wave, The Poynting Vector, Poynting theorem, Polarization of Electromagnetic waves

**Chapter 4. Interaction of Electromagnetic waves with matter**

**[08]**

Boundary condition for the electromagnetic field vector  $-\mathbf{B}, \mathbf{E}, \mathbf{D}$  and  $\mathbf{H}$  at the interface between the two media, reflection and refraction at the boundary of two non conducting media.

**Reference Books:**

1. Introduction to Electrodynamics-David J. Griffiths, Third Edition.
2. Mechanics and Electrodynamics - Brijlal N. Subrahmanyam, JivanSeshan
3. Classical Electrodynamics – S.P. Pure
4. Electrodynamics- B.B. Laud
5. Electrodynamics-Gupta, Kumar and Singh, Pragati Prakashan, Meerut
6. Electromagnetic waves and fields –R.N.Singh

**B.Sc. III<sup>rd</sup> year Physics (Semester-V)**

**Practical**

**Course code PHY-303**

**Paper-XXI**

**Period-45**

**Marks-50**

**List of experiments**

1. Measurement of the focal length of a given convex lens using laser
2. Spectral response of photoconductor (LDR)
3. Diffraction of grating using laser beam
4.  $e$  by Millikan's oil drop method
5. Study of thermocouple (Fe-Cu) and to find inversion temperature
6. Refractive Index R.I. of Optical fiber
7. constant of B.G. by standard condenser method
8. study of absorption spectra of iodine and determination of its wavelength using grating

**Note :-** At least Six experiments should be performed.

**B.Sc. III<sup>rd</sup> year Physics (Semester-V)**

**Practical**

**Course code PHY-304**

**Paper-XXII**

**Marks-50**

**List of experiments**

1. Beam divergence of a diode laser
2. Determination of the diameter of a thin wire using laser
3. To study the interference of light using optical fibers
4. Determination of wavelength of He-Ne laser by transmission grating and reflection grating
5.  $\lambda$  by Koenig's method
6. Edser's A pattern
7.  $e/m$  by Thomson methods by Excel
8. Surface tension by Ripple's method

**Note :-** At least Six experiments should be performed.

**B.Sc. III<sup>rd</sup> year Physics (Semester-VI)**  
**Atomic, Molecular Physics and LASER**  
**Course code PHY-305**  
**Paper-XIX**

**Period-45**

**Marks-50**

- Chapter 1. The Atom model** [10]  
Introduction, Thomson atom model, the Rutherford nuclear atom model, drawbacks of Rutherford atomic model, the Bohr's atom model, Bohr's theory of origin of spectral lines, diagrammatic representation of the series spectrum of the H-atom in the light of Bohr's theory.
- Chapter 2. Vector Atom Model** [15]  
Introduction-vector atom model, Quantum numbers associated with the vector atom model, L-S coupling, j-j coupling, The Pauli's exclusion principle, Selection rules, Intensity Rules, Interval Rule, Normal Zeeman effect, Anomalous Zeeman effect, Stark effect and its experimental study.
- Chapter 3. Molecular spectra** [15]  
Introduction, origin of pure rotational spectrum of a molecule, origin of vibration-rotation spectrum of a molecule, Rayleigh's law of scattering, Raman effect-Discovery, experimental study, Applications of Raman effect-molecular structure, Nature of liquids, Crystal Physics, Nuclear Physics, Chemical effects.
- Chapter 4. LASER** [10]  
Introduction, induced absorption, spontaneous emission, stimulated emission, population inversion, properties of laser beam, laser pumping, Types of laser-Ruby laser, He-Ne laser, carbon dioxide (CO<sub>2</sub>) laser, Applications of laser-Biological, medical and industrial.

**Reference Books**

1. Atomic Physics – J.B. Rajam, S. Chand & Company Ltd.
2. Physics for degree students – C.L. Arora, Dr. P.S. Hemne, S. Chand Publication
3. Modern Physics – R. Murugesan, Er. KiruthigaSivaprasath, S. Chand Publication
4. Introduction of Atomic Spectra-white.
5. Fundamentals of Molecular Spectroscopy- C.N. Banwell and E.M. McCash (McGraw Hill International Edition)

**B.Sc. III<sup>rd</sup> year Physics (Semester-VI)**  
**Non-conventional energy sources and Optical fiber**  
**Course code PHY-306**  
**Paper-XX**

**Period-45**

**Marks-50**

- Chapter1. Non-conventional energy sources (12)**  
Introduction, Biomass, wind energy, tidal energy/Ocean energy, geothermal energy, biogas hydro energy, wind energy, solar energy  
Biogas plant-fixed dome type  
**Wind energy:** Introduction to wind energy, terms and definition: wind, wind farm, wind turbine, vertical axis wind turbine (VAWT), horizontal axis wind turbine (HAWT), propeller (wheel), wind mill, types of wind turbines generator units, monoblade HAWT, twin blade HAWT, merits and limitation of wind energy.
- Chapter 2. Solar Photovoltaic Systems: (10)**  
Introduction to photovoltaic systems, Solar Cell fundamentals: i) Semiconductor, ii) P-N junction, iii) Generation of electron-hole pair by photon absorption, iv) I-V characteristics of solar cell  
**Electrical storage:** Lead acid battery, basic battery theory
- Chapter 3. Introduction of optical fiber (10)**  
Introduction, importance of optical fiber, classification of optical fiber- stepped index fiber, stepped index monomode fiber, Disadvantages of monomode fiber, plastic fiber, latest developed types of optical fibers- HPSUV; HPSIR; Halide; Tapered.
- Chapter4. Fiber cables and fabrication (13)**  
**Fiber fabrication:** Classification of fiber fabrication techniques; external chemical vapour deposition (external CVD), axial vapour deposition (AVD), internal chemical vapour deposition (internal CVD)  
**Fiber Cables:** Construction, Strength members, cable tensile loading, minimum bend radius losses incurred during installation of cables or during subscriber service testing of cable, selection criteria, optical cable fiber laying in telephone.

**References:**

- 1) Optoelectronics; R. A. Barapate (Tech-Max Publication, Pune)
- 2) Principles of Solar Cells, LEDs and Diodes: The role of the PN junction; ADRIAN KITAI (2011 John Wiley & Sons, Ltd)
- 3) Light Sources: Technologies and Applications; Spiros Kitsinelis (CRC Press Taylo & Francis Group, FL 33487-2742) - 2011
- 4) Energy technology (non-conventional, renewable, and conventional) - S. Rao, Dr. B.B. Parulekar, Khanna Publishers.
- 5) Non-conventional energy resources- B.H. Khan, G.D. Rai, R.P. Khare, II<sup>nd</sup> edition, McGraw Hill Education (India) Private Limited, New Delhi.
- 6) Non-conventional Energy Sources- G.D. Rai, Khanna Publisher
- 7) Solar energy and Rural development- S.H. Pawar, C.D. Lokhande & R.N. Patil
- 8) Solar energy, Fundamentals and applications- Garg, Prakash Tata McGraw Hill
- 9) Fiber Optics and Optoelectronics – R.P. Khare, Oxford University Press.

**B.Sc. III<sup>rd</sup> year Physics (Semester-VI)**  
**Practical**  
**Course code PHY-307**  
**Paper-XVII**

**Marks-50**

**List of experiments**

1. Thermal conductivity by Forb's method
2. Rydberg constant
3. B-H curve using magnetometer
4. Determination of Debye's temperature (e.g. Tin)
5. Determination of dielectric constant of liquid/solid
6. Resistance measurement of semiconductor by Vaders Pau's method
7. I-H Curve by Excel
8. Rydberg constant Excel

**Note:-** At least Six experiments should be performed.

**B.Sc. III<sup>rd</sup> year Physics (Semester-VI)**  
**Practical**  
**Course code PHY-308**  
**Paper-XVIII**

**Marks-50**

**List of experiments**

1. Temperature coefficient of resistance of semiconductor
2. Measurement of thickness of thin film by gravimeter/optical/electrical method
3. Temperature of sodium flame
4. Hartmann's dispersion formula
5. Maxwell's bridge (measurement of inductance using impedance at different frequency)
6.  $\lambda$  by grating (normal incidence)
7. Transistorized Regulated power supply using Zener diode.
8. Bridge Rectifier

**Note:-** At least Six experiments should be performed.



### **Compulsory Activities**

Organize a visit / study tour to Thermoelectric / Hydroelectric Power station, Wind mill, Solar farm and submit project report along with a photograph during the final practical examination.

**OR**

Organize study tour to industry / Research centre and submit a report at the time of final practical examination.

**QUESTION PAPER PATTERN**  
**B.Sc.F.Y.(I & II Semester)**  
**PHYSICS**

**Time : 2.30 Hours**

**Max.Marks :50**

Note:-1.All questions carry equal marks

2.Use of logarithmic table and electronic pocket calculator is allowed.

Q.1.Chapt. I (Long question)

10 Marks

OR

Chapt.II (Long question)

Q.2.Chapt.III (Long question)

10 Marks

OR

Chapt.IV (Long question)

Q.3. a)Chapt. I (Short question)

10 Marks

b)Chapt.II(Short question)

OR

a)Chapt.III (Short question)

b)Chapt.IV (Short question)

Q.4.Attempt any two

10 Marks

a)Chapter I Problem

b)Chapter II Problem

c)Chapter III problem

d)Chapter IV oproblem

Q.5. MCQ

10 Marks

Ten MCQ's having four alternatives based on theory and numerical (Minimum two MCQ's from each chapter)