Name of University	R.R.B.M.University Alwar
Name of Faculty	Science
Name of Programme	UG- B. Sc. (Maths Group)
Name of Discipline	Major Discipline -Chemistry, Mathematics, Physics Major/Minor Discipline – Economics, Geography, Geology, Psychology

PROGRAMME PREREQUISITES
Physics and Mathematics courses of Central Board of Secondary Education or equivalent.

PROGRAMME OUTCOMES (POs)

1. Proficiency in Scientific Principles: Students will demonstrate a strong understanding of fundamental scientific principles in physics, chemistry, and mathematics. They will be able to apply these principles to analyze and solve complex problems.

2. Analytical and Critical Thinking: Students will develop analytical and critical thinking skills through the study of physics, chemistry, and mathematics. They will be able to evaluate and interpret data, formulate hypotheses, and draw logical conclusions based on evidence.

3. Quantitative and Computational Skills: Students will acquire proficiency in quantitative and computational methods. They will be able to perform calculations, manipulate mathematical expressions, and use computational tools to solve scientific problems.

4. Experimental and Laboratory Skills: Students will gain hands-on experience in conducting experiments, using laboratory equipment, and analyzing experimental data. They will understand the importance of accurate measurement, data interpretation, and documentation.

5. Problem Solving and Modeling: Students will develop problem-solving skills and the ability to create mathematical models to represent real-world phenomena. They will apply mathematical and scientific concepts to formulate and solve problems in physics, chemistry, and related fields.

6. Interdisciplinary Understanding: Students will develop an interdisciplinary perspective by integrating concepts from physics, chemistry, and mathematics. They will understand the connections and interdependencies among these disciplines and their applications in other scientific and technological areas.

7. Effective Communication: Students will develop effective oral and written communication skills. They will be able to communicate scientific ideas, theories, and experimental results clearly and concisely to both technical and non-technical audiences.

8. Ethical and Professional Responsibility: Students will understand and adhere to ethical and professional standards in scientific research and practice. They will demonstrate integrity, responsible conduct, and respect for intellectual property.

9. Lifelong Learning: Students will recognize the importance of lifelong learning and professional development. They will be motivated to pursue further studies, engage in research, and keep up with advancements in physics, chemistry, and mathematics.

10. Teamwork and Collaboration: Students will develop teamwork and collaboration skills through group projects, laboratory work, and research activities. They will be able to work effectively in diverse teams and contribute to collective goals.

Scheme of Examination-

1 credit = 25 marks for examination/evaluation

Continuous assessment, in which sessional work and the terminal examination will contribute to the final grade. Each course in Semester Grade Point Average (SGPA) has two components- Continuous assessment (20% weightage) and (End of Semester Examination) EoSE (80% weightage).

1. Sessional work will consist of class tests, mid-semester examination(s), homework assignments, etc., as determined by the faculty in charge of the courses of study.
2. Each Paper of EoSE shall carry 80% of the total marks of the course/subject. The EoSE will be of 3 hours duration. Each question will carry equal marks and have two parts as -
   - ➤ Part-A of the paper shall have multiple questions of equal marks. This first question shall be based on knowledge, understanding and applications of the topics/texts covered in the syllabus.
   - ➤ Part B of the paper shall consist of 4 questions with an internal choice of each. The four questions will be set with one from each of the units with internal choice .Third to fourth questions shall be based on applications of the topics/texts covered in the syllabus (60 % weightage) and shall involve solving Problems (40% weightage) if applicable.
3. 75% Attendance is mandatory for appearing in EoSE.
4. To appear in the EoSE examination of a course/subject student must appear in the mid-semester examination and obtain at least a "C" grade in the course/subject.
5. Credit points in a Course/Subject will be assigned only if, the student obtains at least a C grade in midterm and EoSE examination of a Course/Subject.

Contact Hours –

15 Weeks per Semester

L – Lecture	(1 Credit = 1 Hour/Week)
T – Tutorial	(1 Credit = 1 Hour/Week)
S – Seminar	(1 Credit = 2 Hours/Week)
P – Practical/Practicum	(1 Credit = 2 Hours/Week)
F – Field Practice/Projects	(1 Credit = 2 Hours/Week)
SA – Studio Activities	(1 Credit = 2 Hours/Week)
I – Internship	(1 Credit = 2 Hours/Week)
C – Community Engagement and Service	(1 Credit = 2 Hours/Week)

Exit and Entrance Policy

1. Students who opt to exit after completion of the first year and have secured 48 credits will be awarded a **UG Certificate** if, in addition, they complete

one internship of 4 credits during the summer vacation of the first year. These students are allowed to re-enter the degree programme within three years and complete the degree programme within the stipulated maximum period of seven years.

2. Students who opt to exit after completion of the second year and have secured 96 credits will be awarded the UG diploma if, in addition, they complete one internship of 4 credits during the summer vacation of the second year. These students are allowed to re-enter within a period of three years and complete the degree programme within the maximum period of seven years.

3. Students who wish to undergo a 3-year UG programme will be awarded UG Degree in the Major discipline after successful completion of three years, securing 150 credits and satisfying the minimum credit requirement.

4. A four-year UG Honours degree in the major discipline will be awarded to those who complete a four-year degree programme with 200 credits and have satisfied the minimum credit requirements.

5. Students who secure 75% marks and above in the first six semesters and wish to undertake research at the undergraduate level can choose a research stream in the fourth year. They should do a research project or dissertation under the guidance of a faculty member of the University/College. The research project/dissertation will be in the major discipline. The students who secure 200 credits, including 12 credits from a research project/dissertation, are awarded UG Degree (Honours with Research).

Letter Grades and Grade Points

Letter Grade	Grade Point	Marks Range (%)
O (outstanding)	10	91 - 100
A+ (Excellent)	9	81 - 90
A (Very good)	8	71 - 80
B+ (Good)	7	61 - 70
B (Above average)	6	51 - 60
C (Average)	5	40 - 50
P (Pass)	4	
F (Fail)	0	
Ab (Absent)	0	

When students take audit courses, they may be given a pass (P) or fail (F) grade without any credits.

Name of University	R.R.B.M.University Alwar
Name of Faculty	UG- B. Sc. (Maths Group)
Name of Discipline	Chemistry

SEMESTER-WISE PAPER TITLES WITH DETAILS

UG0-B. Sc. (Maths Group)

#	Level	Semester	Type	CHEMISTRY Title	L	T	P	Total
1.	5	I	MJR	CHM-51T-101-	4	0	0	4
2.	5	I	MJR	CHM-51P-102-	0	0	2	2
3.	5	II	MJR	CHM-52T-103-	4	0	0	4
4.	5	II	MJR	CHM-52P-104-	0	0	2	2
5.	6	III	MJR	CHM-63T-201-	4	0	0	4
6.	6	III	MJR	CHM-63P-202-	0	0	2	2
7.	6	IV	MJR	CHM-64T-203-	4	0	0	4
8.	6	IV	MJR	CHM-64P-204-	0	0	2	2
9.	7	V	MJR	CHM-75T-301-	4	0	0	4
10.	7	V	MJR	CHM-75T-302-	0	0	2	2
11.	7	VI	MJR	CHM-76T-303-	4	0	0	4
12.	7	VI	MJR	CHM-76T-304-	0	0	2	2

Name of University	R.R.B.M.University Alwar
Name of Faculty	UG- B. Sc. (Maths Group)
Name of Discipline	Mathematics

SEMESTER-WISE PAPER TITLES WITH DETAILS

#	Level	Semester	Type	Mathematics		Credits		
				Title	L	T	P	Total
1.	5	I	MJR	MAT-51T-101-	4	0	0	4
2.	5	I	MJR	MAT-51P-102-	0	0	2	2
3.	5	II	MJR	MAT-52T-103-	4	0	0	4
4.	5	II	MJR	MAT-52P-104-	0	0	2	2
5.	6	III	MJR	MAT-63T-201-	4	0	0	4
6.	6	III	MJR	MAT-63P-202-	0	0	2	2
7.	6	IV	MJR	MAT-64T-203-	4	0	0	4
8.	6	IV	MJR	MAT-64P-204-	0	0	2	2
9.	7	V	MJR	MAT-75T-301-	4	0	0	4
10.	7	V	MJR	MAT-75T-302-	0	0	2	2
11.	7	VI	MJR	MAT-76T-303-	4	0	0	4
12.	7	VI	MJR	MAT-76T-304-	0	0	2	2

UG- B. Sc. (Maths Group)

20/9/23

20/9/23

Name of University	R.R.B.M.University Alwar
Name of Faculty	UG- B. Sc. (Maths Group)
Name of Discipline	Physics

SEMESTER-WISE PAPER TITLES WITH DETAILS

UG-B. Sc. (Maths Group)

#	Level	Semester	Type	PHYSICS Title	Credits L	T	P	Total
1.	5	I	MJR	UG-PHY-51T-101-Mechanics & Oscillations	4	0	0	4
2.	5	I	MJR	UG-PHY-51P-102-Physics Lab-I	0	0	2	2
3.	5	II	MJR	UG-PHY-52T-103-Electromagnetism	4	0	0	4
4.	5	II	MJR	UG-PHY-52P-104-Physics Lab-II	0	0	2	2
5.	6	III	MJR	UG-PHY-63T-201-Optics	4	0	0	4
6.	6	III	MJR	UG-PHY-63P-202-Physics Lab-III	0	0	2	2
7.	6	IV	MJR	UG-PHY-64T-203-Thermodynamics & Statistical Physics	4	0	0	4
8.	6	IV	MJR	UG-PHY-64P-204-Physics Lab-IV	0	0	2	2
9.	7	V	MJR	UG-PHY-75T-301- Electronics and Solid-State Devices	4	0	0	4
10.	7	V	MJR	UG-PHY-75P-302-Physics Lab-V	0	0	2	2
11.	7	VI	MJR	UG-PHY-76T-303-Quantum Mechanics and Spectroscopy	4	0	0	4
12.	7	VI	MJR	UG-PHY-76P-304-Physics Lab-VI	0	0	2	2
13.	8	VII	MJR	UG-PHY-87T-401-Solid State Physics	4	0	0	4
14.	8	VII	MJR	UG-PHY-87T-402-Mathematical Physics	4	0	0	4
15.	8	VII	MJR	UG-PHY-87P-403-Physics Lab-VII	0	0	2	2
16.	8	VIII	MJR	UG-PHY-88T-404-Nuclear Physics	4	0	0	4
17.	8	VIII	MJR	UG-PHY-88T-405-Numerical Methods and Computer Programming	4	0	0	4
18.	8	VIII	MJR	UG-PHY-88P-406-Physics Lab-VIII	0	0	2	2

20/9/23

20/9/23

Syllabus: UG-B.Sc.
I-Semester- Physics
(2023-2024)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks (Midterm + EoSE)	Minimum Marks (Midterm + EoSE)
Theory	UG-PHY-51T-101-Mechanics & Oscillations	1 Hrs-MT 3 Hrs-EoSE	20 Marks-MT 80 Marks-EoSE	8 Marks-MT 32 Marks-EoSE
Practical	UG-PHY-51P-102-Physics Lab-I	2 Hrs-MT 4 Hrs-EoSE	10 Marks-MT 40 Marks-EoSE	4 Marks-MT 16 Marks-EoSE

Semester	Code of the Course	Title of the Course/Paper	NHEQF Level	Credits
I	UG-PHY-51T-101	Mechanics & Oscillations	5	4

Level of Course	Type of the Course	Delivery Type of the Course	
Introductory	Major/Minor	Lecture, Sixty Lectures including diagnostic and formative assessments during lecture hours.	
Prerequisites	Physics and Mathematics courses of Central Board of Secondary Education or equivalent.		
Objectives of the Course:	Objectives of the Course in Mechanics: The objective of the course is to provide students with a comprehensive understanding of classical mechanics, including the laws of motion, frames of reference, forces, motion of particles and rigid bodies, oscillations, and central forces. The course aims to develop their knowledge and skills in analyzing and solving problems related to these topics, using appropriate mathematical formalism and physical concepts.		

Detailed Syllabus

PHY-51T-101- Mechanics & Oscillations

Unit -I
Physical Law and frame of Reference:)a (Inertial and non-inertial frames, Transformation of displacement, velocity .acceleration between different frames of reference involving translation . Galilean transformation and invariance of Newton's laws.)b (Coriolis Force :Transformation of displacement, velocity and acceleration between rotating frame, Pseudo forces, Coriolis force, Motion relative to earth , Focult's pendulum) .c (Conservative Forces :Introduction about conservative and non-conservative forces, Rectilinear motion under conservative forces, Discussion of potential energy curve and motion of a particle.
(15 Lectures)

Unit -II:
Centre of Mass : Introduction about Centre of Mass .Centre of Mass Frame :Collision of two particles in one and two dimensions)elastic and inelastic(, Slowing down of neutrons in a moderator, Motion of a system with varying mass, Angular momentum concept, conservation and charge particle scattering by a nucleus .
Rigid body: Equation of a motion of a rotating body. Inertial coefficient. Case of J not parallel to ω. The kinetic energy of rotation and the idea of principal axes. The processional motion of the spinning Top. **(15 Lectures)**

Unit -III
Motion under Central Forces : Introduction about Central Forces, Motion under central forces, gravitational interaction .inertia und gravitational mass, General solution under gravitational interaction .Keplers laws, Discussion of trajectories, Cases of elliptical and circular orbits, Rutherford scattering.
Damped Harmonic Oscillations : Introduction about oscillations in a potential well, Damped force and motion under damping .Damped Simple Harmonic Oscillator, Power dissipation, Anharmonic oscillator and simple pendulum as an example.
(15 Lectures)

Unit-IV
Driven Harmonic Oscillations : Driven harmonic oscillator with damping, Frequency response . Phase factor, Resonance, .Series and parallel LCR circuit, Electromechanical Galvanometer.
Coupled Oscillations: Equation of motion of two coupled Simple Harmonic Oscillators, Normal modest motion in mixed modes .Trust behavior, Dynamics of a number of oscillators with neighbor interactions. **(15 Lectures)**

Suggested Books and References –

1. Mechanics, Berkeley Physics, Vol.1, Kittel, Knight, et.al. 2007, Tata McGraw-Hill
2. An introduction to Mechanics, D. Kleppner, R.J. Kolenkow, 1973, McGraw-Hill
3. Feynman Lectures, Vol. I, R.P. Feynman, R.B. Leighton, M. Sands, 2008, Pearson Education.
4. Course of Theoretical Physics, Vol-I Mechanics, L.D. Landau, E.M. Lifshitz, Butterworth-Heinemann
5. Mechanics, D.S. Mathur, S. Chand and Company Limited,

6. Theoretical Mechanics, M.R. Spiegel, 2006, Tata McGraw Hill.
7. Introduction to Classical Mechanics: With Problems and Solutions, David Morin
8. Classical Mechanics, Herbert Goldstein, Charles P. Poole, and John L. Safko
9. Classical Mechanics, John R. Taylor
10. Mechanics, Keith R. Symon
11. The Physics of Waves & Oscillations, Bajaj
12. Waves, A. P. French

Suggested E-resources:

1. **Online Lecture Notes and Course Materials:**
- MIT OpenCourseWare: Classical Mechanics - This resource provides lecture notes, problem sets, and solutions for a complete course on classical mechanics: https://ocw.mit.edu/courses/physics/8-01sc-classical-mechanics-fall-2016/
- HyperPhysics - This online resource provides concise explanations and interactive simulations for various topics in mechanics: http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html

Course Learning Outcomes:

By the end of the course, students should be able to:
1. Understand the concept of inertial and non-inertial frames of reference and their implications on the laws of motion.
2. Apply transformations of displacement, velocity, and acceleration between different frames of reference involving translation.
3. Explain the Galilean transformation and the invariance of Newton's laws.
4. Analyze the motion in rotating frames, including the transformation of displacement, velocity, and acceleration, and the effects of pseudo forces such as the Coriolis force.
5. Analyze the motion of a Foucault pendulum and understand its relation to the rotation of the Earth.
6. Define conservative and non-conservative forces and analyze rectilinear motion under conservative forces.
7. Analyze potential energy curves and understand the motion of particles under conservative forces.
8. Explain the concept of the center of mass and its relevance in the motion of systems of particles.
9. Apply the concept of conservation of angular momentum and analyze particle scattering by a nucleus.
10. Understand the equations of motion for rotating bodies and the concept of the moment of inertia.
11. Analyze the kinetic energy of rotation and the motion of spinning tops.
12. Understand the motion under central forces, including gravitational interaction, and apply Kepler's laws.
13. Analyze damped harmonic oscillations and understand the effects of damping on oscillatory motion.
14. Analyze driven harmonic oscillators with damping and understand frequency response and power dissipation.
15. Explain the behavior of coupled oscillators and analyze systems of oscillators with neighbor interactions.

Semester	Code of the Course	Title of the Course/Paper	NHEQF Level	Credits
I	UG-PHY-51P-102	Physics Lab-I	5	2

Level of Course	Type of the Course	Delivery Type of the Course		
Introductory	Major/Minor	Practical, Sixty hours of practical including diagnostic and formative assessment during practical hours.		
Prerequisites	Physics and Mathematics courses of Central Board of Secondary Education or equivalent.			
Objectives of the Course:	The objective of the physics lab-I, with the mentioned experiments, is to provide students with hands-on experience in conducting experiments related to oscillations, damping, coupled oscillators, and properties of materials. The lab aims to reinforce theoretical concepts learned in the classroom, develop practical skills, and enhance the understanding of physics principles through experimentation.			

UG0803-PHY-51P-102: Physics Lab-I

The colleges are free to set new experiments of equivalent standards. This should be intimated and approved by the Convener, Board of Studies before the start of the academic session. It is binding on the college to have an experimental set-up of at least ten experiments listed below. In case the number of experiments performed by the student is less than eight, his marks shall be scaled down in the final examination on a pro-rata basis. Laboratory examination paper will be set by the external examiner out of eight or more experiments available at the centre

List of Experiments –

1. Study the variation of the time period with amplitude in large-angle oscillations using a compound pendulum.
2. To study the damping using a compound pendulum.
3. To study the excitation of normal modes and measure frequency splitting into two coupled oscillators.
4. To study the frequency of energy transfer as a function of coupling strength using coupled oscillators.
5. To study the viscous fluid damping of a compound pendulum and determine the damping coefficient and Q of the oscillator.
6. To study the electromagnetic damping of a compound pendulum and to find the variation of damping coefficients with the assistance of a conducting lamina.
7. Study of normal modes of a coupled pendulum system. Study of oscillations in mixed modes and find the period of energy exchange between the two oscillators.
8. To determine Young's modulus by bending of the beam.
9. To determine Y, σ and n by Searle's method
10. To determine the modulus of rigidity of a wire using Maxwell's needle.
11. To determine the moment of Inertia of a fly-wheel.
12. To find the motion of a spring and calculate (a) Spring constant (b) Acceleration due to gravity (g) (c) Modulus of Rigidity
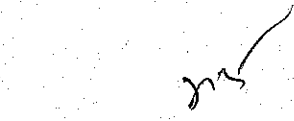
Suggested Books and References –

Suggested E-resources.

Course Learning Outcomes:

      Through these experiments, students will develop practical skills in experimental techniques, data collection, analysis, and interpretation. They will also enhance their understanding of fundamental concepts and principles in oscillations, damping, coupled oscillators, and material properties. The lab experiences will foster critical thinking, problem-solving abilities, and the application of theoretical knowledge to real-world scenarios.

Syllabus: UG0803-B.Sc.
II-Semester- Physics
(2023-2024)

Type	Paper code and Nomenclature	Duration of Examination	Maximum Marks (Midterm + EoSE)	Minimum Marks (Midterm + EoSE)
Theory	UG-PHY-52T-103-Electromagnetism	1 Hrs-MT 3 Hrs-EoSE	20 Marks-MT 80 Marks-EoSE	8 Marks-MT 32 Marks-EoSE
Practical	UG-PHY-52P-104-Physics Lab-II	2 Hrs-MT 4 Hrs-EoSE	10 Marks-MT 40 Marks-EoSE	4 Marks-MT 16 Marks-EoSE

Semester	Code of the Course	Title of the Course/Paper	NHEQF Level	Credits
II	UG-PHY-52T-103	Electromagnetism	5	4
Level of Course	**Type of the Course**		**Delivery Type of the Course**	
Introductory	Major/Minor	Lecture, Sixty Lectures including diagnostic and formative assessments during lecture hours.		
Prerequisites	Physics and Mathematics courses of Central Board of Secondary Education or equivalent.			
Objectives of the Course:	Objectives of the Course in Electromagnetism: The objective of the course is to provide students with a comprehensive understanding of the fundamental concepts and principles of electromagnetism. It aims to develop their knowledge and skills in analyzing scalar and vector fields, electric and magnetic fields, and their interactions, as described by Maxwell's equations. The course will also cover important topics such as electric potential, polarization, magnetostatics, and electromagnetic waves.			

Detailed Syllabus

UG0803-PHY-52T-103-Electromagnetism

Unit I

Scaler and Vector Fields: Concept of Field, Scalar and Vector Fields, Gradient of scalar field, Physical significance and formalism of Gradient, Divergence and Curl of a vector field Cartesian co-ordinates system, Problems based on Gradient, Divergence and curl operators. Concept of Solid angle, Gauss divergence and Stoke's theorem. Gauss law from inverse square law. Differential form of Gauss law.

Electric Field and Potential Energy: Invariance of Charge, Potential energy of system of (i) Discrete N-charges (ii) Continuous charge distribution. Energy required to built a uniformly charged sphere, classical radius of electron, Electric field due to a short electric dipole, Interaction of electric dipole with external uniform and non-uniform electric field, potential due to a uniformly charged spherical shell.

Poisson's and Laplace equations in Cartesian co-ordinates and their applications to solve the problems of electrostatics. Electric field measured in moving frames, Electric field of a point charge moving with constant velocity. **(15 Lectures)**

Unit II

Electric field in matter: Multipole expansion, defination of moments of charge distribution, Dielectrics, Induced dipole moments, polar non polar molecules, Free and bound charges. Polarization, Atomic polarizabilty, electric displacement vector, electric susceptibility, dielectric constant, relation between them.

Electric potential and electric field due to a uniformly polarized sphere (i) out side the sphere (ii) at the surface of the sphere (iii) inside the sphere, Electric field due to a dielectric sphere placed in a uniform electric field (a) out side the sphere (b) inside the sphere, Electric field-due to a charge placed in dielectric medium and Gauss law. Clausius-Mossotti relation in dielectrics. **(15 Lectures)**

Unit III

Magnetostatics and Magnetic field in matter: Lorentz force, properties of magnetic field, Ampere's law, field due to a current carrying solid conducting cylinder (a) out side (b) at the surface and (ii) inside the cylinder. Ampere's law in differential form, Introduction of Magnetic Vector potential, Poisson's equation for vector potential, Deduction of Bio-Savart law using Magnetic Vector potentials, Differential form of Ampere's law, Atomic magnet, Gyromagnetic ratio, Bohr-magneton, Larmor frequency, induced magnetic moment and dia-magnetism, spin magnetic moment, para and ferro magnetism, Intensity of Magnetization, Magnetic permeability and Susceptibility, free and bound current densities, Magnetic field due to a uniformly magnetized material and Non-uniformly magnetized material. **(15 Lectures)**

Unit IV

Maxwell's Equations and Electromagnetic waves: Displacement current, Maxwell's Equations, Electromagnetic waves, Electromagnetic waves in an Isotropic medium, Properties of electromagnetic waves, Energy density of Electromagnetic waves, Pointing vector, Radiation pressure of free space, Electromagnetic waves in Dispersive medium, Spectrum of Electromagnetic waves. **(15 Lectures)**

1. Electricity & Magnetism; A.S. Mahajan & Abbas A. Rangwala, Tata McGraw-Hill
2. Introduction to Electrodynamics; David J. Griffith, Prentice Hall
3. Berkley Physics Course, Vol. II, Edward M. Purcell
4. Fundamental University Physics Vol II: Fields and Waves; M. Alonso and E.J. Finn: Addison-Wesley Publishing Company

Suggested E-resources-

1. MIT OpenCourseWare: Electricity and Magnetism - This resource offers lecture notes, assignments, and exams for a complete course on electricity and magnetism: https://ocw.mit.edu/courses/physics/8-02sc-physics-ii-electricity-and-magnetism-spring-2011/
2. HyperPhysics - This online resource provides concise explanations and interactive simulations for various topics in electrostatics and electric fields: http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html

Course Learning Outcomes:

By the end of the course, students should be able to:
1. Understand the concept of scalar and vector fields and their physical significance.
2. Demonstrate knowledge of gradient, divergence, and curl operators and their applications in electromagnetism.
3. Apply Gauss divergence and Stoke's theorems to analyze electric and magnetic fields.
4. Explain the behavior of electric fields and potential energy in different charge distributions.
5. Analyze the interaction of electric dipoles with external electric fields and calculate the resulting potentials.
6. Solve problems related to Poisson's and Laplace's equations in electrostatics.
7. Describe the behavior of electric fields in different types of matter, including dielectrics and polarized spheres.
8. Understand the concept of electric displacement, susceptibility, and dielectric constant.
9. Analyze the behavior of magnetic fields in various materials and the effects of currents on magnetic fields.
10. Apply Ampere's law and the magnetic vector potential to calculate magnetic fields in different scenarios.
11. Explain the properties of electromagnetic waves and their behavior in isotropic and dispersive media.
12. Calculate the energy density and radiation pressure of electromagnetic waves.
13. Understand the spectrum of electromagnetic waves and its implications.

Semester	Code of the Course	Title of the Course/Paper	NHEQF Level	Credits
II	UG-PHY-52P-104	Physics Lab-II	5	2
Level of Course	Type of the Course	Delivery Type of the Course		
Introductory	Major/Minor	Practical, Sixty hours of practical including diagnostic and formative assessment during practical hours.		
Prerequisites	Physics and Mathematics courses of Central Board of Secondary Education or equivalent.			
Objectives of the Course:	1. To provide hands-on experience in conducting experiments related to electricity and magnetism. 2. To develop practical skills in using various electrical components and instruments. 3. To reinforce theoretical concepts learned in the corresponding lecture course through practical applications. 4. To enhance problem-solving and analytical skills by analyzing experimental data and interpreting results. 5. To promote scientific inquiry, critical thinking, and the ability to design and execute experiments. 6. To foster teamwork and collaboration in conducting experiments and analyzing results. 7. To develop skills in accurately measuring and recording experimental data.			

UG-PHY-52P-104: Physics Lab-II

The colleges are free to set new experiments of equivalent standards. This should be intimated and approved by the Convener, Board of Studies before the start of the academic session. It is binding on the college to have an experimental set-up of at least ten experiments listed below. In case the number of experiments performed by the student is less than eight, his marks shall be scaled down in the final examination on a pro-rata basis. Laboratory examination paper will be set by the external examiner out of eight or more experiments available at the centre

List of Experiments –

1. To study the Faradays Law of electromagnetic induction.
2. To study the variation of power transfer by two different loads by a D.C. source and to verify the maximum power transfer theorem.
3. To study the variation of charge and current in an RC circuit with a different time constant)using a DC source.(
4. To study the behaviour of an RC circuit with varying resistance and capacitance using AC mains as a power source and also to determine the impedance and phase relations.
5. To study the rise and decay of current in an LR circuit with a source of constant emf.
6. To study the voltage and current behaviour of an LR circuit with an AC power source .Also determine power factor, impedance and phase relations.
7. To study the magnetic field along the axis of a current-carrying circular coil .Plot the necessary graph and hence find the radius of the circular coil.
8. To study the frequency response of a series LCR series circuit and to estimate the resonant frequency and find out Q-factor and band width.

9. To study the frequency response and to find resonant frequencies of L-C-R parallel circuits. Also to find the quality factor and band width in L-C-R series circuit.
10. To determine the specific resistance of a material and determine the difference between two small resistance using Carey Fosters Bridge.
11. To convert a galvanometer into an ammeter of a given range.
12. To convert a galvanometer into a voltmeter of a given range.

Suggested Books and Reference –
Suggested E-resources.

Course Learning Outcomes:

By the end of the course, students should be able to:
1. Demonstrate proficiency in using various electrical components and instruments required for conducting experiments.
2. Apply theoretical concepts of electricity and magnetism to design and execute experiments.
3. Analyze experimental data using appropriate mathematical and statistical techniques.
4. Interpret experimental results and draw conclusions based on data analysis.
5. Develop skills in accurately measuring physical quantities and recording experimental observations.
6. Communicate experimental procedures, results, and conclusions effectively in written reports.