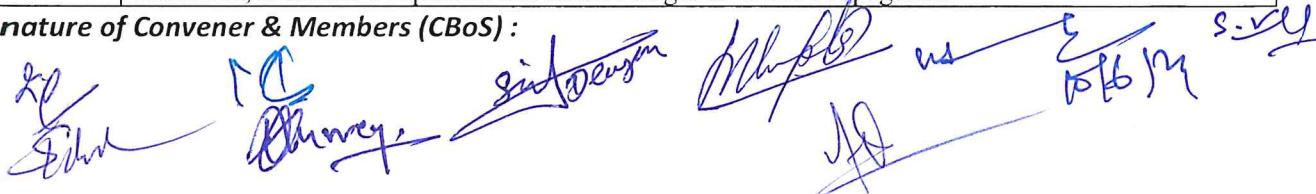


**FOUR YEARS UNDERGRADUATE PROGRAM (2024-28)**  
**DEPARTMENT OF PHYSICS**  
**COURSE CURRICULUM**

<b>PART – A: INTRODUCTION</b>			
<b>Program: Bachelor in Science (Certificate/ Diploma/ Degree/ Honors)</b>		<b>Semester: II</b>	<b>Session: 2024-25</b>
1	<b>Course Code</b>	<b>PHGE-02 T</b>	
2	<b>Course Title</b>	<b>ELECTRICITY AND MAGNETISM</b>	
3	<b>Course Type</b>	<b>Generic Elective Course</b>	
4	<b>Pre-requisite (if any)</b>	<b>As per Program</b>	
5	<b>Course Learning Outcomes (CLO)</b>	After going through the course, the student should be able to: <ul style="list-style-type: none"> <li>➤ State various laws related with electrostatics, dielectric, electric current, magnetism and electromagnetic induction.</li> <li>➤ Apply vector (electric fields, Coulomb's law) and scalar (electric potential, electric potential energy) formalisms of electrostatics.</li> <li>➤ Compare rise and decay of current in LR, CR, LCR circuits.</li> <li>➤ Apply Biot-Savart law for calculation of magnetic field in simple geographic situations.</li> <li>➤ Derive and analyze Maxwell's equations.</li> </ul>	
6	<b>Credit Value</b>	<b>03 Credits</b>	<b>1 Credit= 15 Hours for Learning &amp; Observation</b>
7	<b>Total Marks</b>	<b>Maximum Marks: 100</b>	<b>Minimum Pass Marks: 40</b>
<b>PART – B: CONTENT OF THE COURSE</b>			
<b>Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours)</b>			
Unit	Topics (Course contents)		No. of Periods
<b>I</b>	<b>Power plants in Chhattisgarh:</b> An overview of thermal and hydroelectric power plants in Chhattisgarh. <b>Vector Analysis:</b> Divergence & Curl of Vector fields, Line, surface and volume integrals of Vector fields, Gauss-divergence theorem and Stoke's theorem of vectors and its application in electrostatics and magnetostatics. <b>Electrostatics field:</b> Electrostatic Field, electric flux, Gauss's theorem of electrostatics, Applications of Gauss theorem- Electric field due to point charge, infinite line of charge, plane charged sheet, charged conductor.		12
<b>II</b>	<b>Electrostatic potential:</b> Electric potential as line integral of electric field, potential due to a point charge, Calculation of electric field from potential, Capacitance of Parallel plate capacitor, Energy per unit volume in electrostatic field. <b>Dielectric &amp; Electric Currents:</b> Dielectric medium, Polarisation, Displacement vector, Gauss's theorem in dielectrics, Parallel plate capacitor completely filled with dielectric. Steady current, current density J, non – steady current and Continuity equation, Rise and decay of current in LR, CR, LCR circuits.		13
<b>III</b>	<b>Magnetism:</b> Magnetostatics: Biot-Savart's law and its applications- straight conductor, circular coil, solenoid carrying current, Divergence and curl of magnetic field, Magnetic vector potential, Ampere's circuital law, Magnetic properties of materials: Magnetic intensity, magnetic induction, permeability, magnetic susceptibility, Brief introduction of dia, para and ferro-magnetic materials.		10
<b>IV</b>	<b>Electromagnetic Induction:</b> Faraday's laws of electromagnetic induction, Lenz's law, self and mutual inductance, L of single coil, M of two coils, Energy stored in magnetic field.  <b>Maxwell's equations and Electromagnetic wave propagation:</b> Equation of continuity of current, Displacement current, Maxwell's equations, Wave equation in free space.		10
<b>Keywords:</b>	Vector calculus, Electrostatics, Dielectrics and Electric Current, Magnetism, Electromagnetic Induction, Maxwell's Equation and Electromagnetic Wave Propagation		

**Signature of Convener & Members (CBoS) :**



## PART – C: LEARNING RESOURCES

### Text Books, Reference Books and Others

#### Text Books

1. Electricity and Magnetism, D C Tayal, 1988, Himalaya Publishing House.
2. Unified Physics – Part II, R. P. Goyal, Shivalal Agrawal and Sons
3. Unified Physics – Navbodh Publications
4. Introduction to Electrodynamics and Electromagnetism, H. C. Verma,

#### Reference Books

1. Vector analysis – Schaum's Outline, M.R. Spiegel, S. Lipschutz, D. Spellman, 2nd Edn., 2009, McGraw- Hill Education.
2. University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.

### Online Resources (e-books/ learning portals/ other e-resources)

1. All e-books of physics <https://www.e-booksdirectory.com/listing.php?category=2>
2. Free physics text book in PDF  
[https://www.motionmountain.net/?gclid=CjwKCAjwmq3kBRB\\_EiwAjkNDp5v8Yv6xK1s0Kma0VR0AWGlichRwFfCC0-vpZK1jrPoEOAnBq8fcqRoCILsQAvD\\_BwE](https://www.motionmountain.net/?gclid=CjwKCAjwmq3kBRB_EiwAjkNDp5v8Yv6xK1s0Kma0VR0AWGlichRwFfCC0-vpZK1jrPoEOAnBq8fcqRoCILsQAvD_BwE)
3. Cambridge University Books for Physics <https://www.cambridgeindia.org/>
4. Books for solving physics problems <https://bookboon.com/en/physics-ebooks>
5. NPTEL Online courses: [https://onlinecourses.nptel.ac.in/noc21\\_ph05/preview](https://onlinecourses.nptel.ac.in/noc21_ph05/preview)
6. <https://archive.nptel.ac.in/courses/115/104/115104088/>
7. Classical Electromagnetism - 1 (Electrostatics) <https://bsc.hcverma.in/course/cee1>
8. Classical Electromagnetism - 2 (Electrostatics) <https://bsc.hcverma.in/course/cee2>

## PART – D: Assessment and Evaluation

### Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Examination (ESE): 70 Marks

Continuous Internal Assessment (CIA): (By course teacher)	Internal Test/ Quiz (2):	20 + 20	Better marks out of the two Test / Quiz + marks obtained in Assignment shall be considered against 30 Marks
	Assignment/ Seminar (1):	10	
	Total Marks:	30	

End Semester Examination (ESE):	Two section – A & B Section A: Q1. Objective – 10 x 1 = 10 Mark; Q2. Short answer type- 5x4 = 20 Marks Section B: Descriptive answer type, 1 out of 2 from each unit- 4 x 10 = 40 Marks
---------------------------------	---

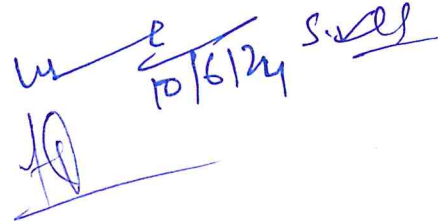
Name and Signature of Convener & Members of CBoS:









 10/6/24

**FOUR YEARS UNDERGRADUATE PROGRAM (2024 – 28)**

**DEPARTMENT OF PHYSICS**

**COURSE CURRICULUM**

<b>PART – A: INTRODUCTION</b>			
<b>Program: Bachelor in Science (Certificate/ Diploma/ Degree/ Honors)</b>		<b>Semester: II</b>	<b>Session: 2024-25</b>
1	Course Code	<b>PHGE- 02 P</b>	
2	Course Title	<b>Electricity &amp; Magnetism</b>	
3	Course Type	<b>Generic Elective Course</b>	
4	Pre-requisite (if any)	<b>As per program</b>	
5	Course Learning Outcomes (CLO)	<p><i>After the completion of the course, Students are expected to understand working laws of Electricity, Magnetism and EMWs. The students will also be able to</i></p> <ul style="list-style-type: none"> <li>➤ <i>Verify various circuit laws, network theorems, using simple electric circuits. Assemble required parts/devices and arrange them to perform experiments.</i></li> <li>➤ <i>Verify various laws in electricity and magnetism such as Lenz's law, Faraday's law and learn about the construction, working of various measuring instruments</i></li> <li>➤ <i>Record/ observe data as required by the experimental objectives. Analyze recorded data and formulate it to get desired results.</i></li> <li>➤ <i>Interpret results and check for attainment of proposed objectives related to laws of Electricity, Magnetism and its applications</i></li> </ul>	
6	Credit Value	<b>01 Credit</b>	<b>1 Credit = 30 Hours Laboratory Work</b>
7	Total Marks	<b>Maximum Marks: 50</b>	<b>Minimum Pass Marks: 20</b>
<b>PART – B: CONTENT OF THE COURSE</b>			
<b>Total No. of learning-Training/performance Periods - 30 Periods (30 Hours)</b>			
<b>Sr. No.</b>	<b>Objects (At least 10 of the following or related Experiments)</b>	<b>No. of Periods</b>	
<b>1</b>	To use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages,(c) DC Current, and (d) checking electrical fuses.	<b>30</b>	
<b>2</b>	To compare capacitances using De'Sauty's bridge.		
<b>3</b>	Measurement of field strength B and its variation in a Solenoid Determine (dB/dx).		
<b>4</b>	To study the Characteristics of a Series RC Circuit.		
<b>5</b>	To study a series LCR circuit and determine its (a) Resonant Frequency, (b) Quality Factor.		
<b>6</b>	To study a parallel LCR circuit and determine its (a) Anti-resonant frequency and (b) Quality factor Q.		
<b>7</b>	To determine a Low Resistance by Carey Foster's Bridge.		
<b>8</b>	To verify the Thevenin and Norton theorem.		
<b>9</b>	To verify the Superposition, and Maximum Power Transfer Theorem.		
<b>10</b>	To use a vibration magnetometer and study magnetic field.		
<b>11</b>	Study of magnetic field due to a current loop.		
<b>12</b>	Study of magnetic fields using Deflection Magnetometer		
<b>13</b>	Mini Project: Construction and Study of Solenoid and measurement of its magnetic field		
<b>Keywords:</b>	Multimeter, Capacitance Comparison, Magnetic Field, RC Circuit, Series LCR Circuit, Parallel LCR Circuit, Low Resistance Measurement, Electrical Theorems		

**Signature of Convener & Members (CBoS) :**

## PART – C: LEARNING RESOURCES

### Text Books, Reference Books and Others

#### Text Books Recommended-

1. Engineering Practical Physics, S. Panigrahi & B.Mallick,2015, Cengage Learning India Pvt. Ltd.
2. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.
3. Unified Practical Physics : R P Goyal, Shivalal Agrawal & Sons
4. Unified Practical Physics: Yugbodh Prakashan
5. Unified Practical Physics: Navbodh Prakashan

#### Reference Books Recommended-

1. Basic Electrical and Electronics Engineering by S. K. Bhattacharya
2. A Textbook of Electrical Technology by B.L. Theraja and A.K. Theraja (Volumes 1 and 2)
3. Engineering Circuit Analysis by William H. Hayt, Jack E. Kemmerly, and Steven M. Durbin
4. Practical Physics by G.L. Squires

### Online Resources (e-books/ learning portals/ other e-resources)

1. Link for e-Books for Physics: Physics Practical:  
<https://www.uou.ac.in/sites/default/files/slm/BSCPH-104.pdf>
2. Virtual Lab :<https://vlab.amrita.edu/index.php?sub=1&brch=192>
3. <http://emv-au.vlabs.ac.in/#>
4. <https://www.ae.msstate.edu/vlsm/>
5. <https://nationalmaglab.org/magnet-academy/watch-play/interactive-tutorials>
6. <https://jigyasa-csir.in/cgcri/n12-t4-a3/>

## PART – D: ASSESSMENT AND EVALUATION

### Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam(ESE): 35 Marks

<b>Continuous Internal Assessment (CIA):</b> (By Course Teacher)	Internal Test / Quiz-(2):	<b>10 &amp; 10</b>	Better marks out of the two Test / Quiz + Marks obtained in Assignment shall be considered against <b>15</b> Marks
	Assignment/Seminar +Attendance –	<b>05</b>	
	Total Marks -	<b>15</b>	
<b>End Semester Exam (ESE):</b>	<b>Laboratory Performance: On spot Assessment</b>		<b>Managed by</b> Course teacher as per lab. status
	Performed the Task based on lab. work	- 20 Marks	
	Spotting based on tools & technology (written) –	10 Marks	
	Viva-voce (based on principle/technology)	- 05 Marks	

Name and Signature of Convener & Members of CBoS:

