THE UDAYNARAYANPUR MADHABILATA MAHAVIDYALAYA PHYSICS DEPARTMENT: LAUNCHING YOUR JOURNEY INTO DISCOVERY

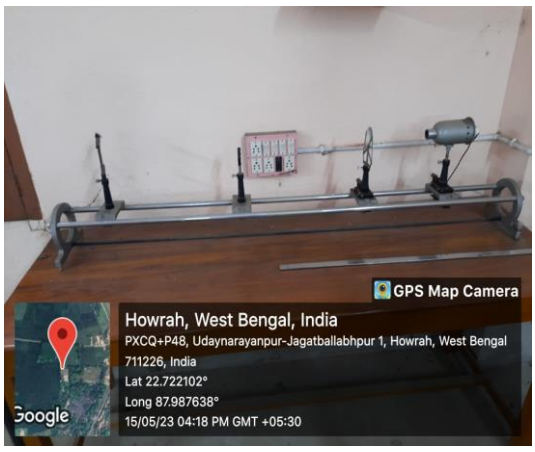
The Physics Department at our college fosters a vibrant community of learners dedicated to exploring the fundamental laws of the universe. We offer a comprehensive undergraduate program designed to equip you with a strong foundation in physics while igniting your passion for scientific inquiry. The Physics Department is dedicated to fostering a love for learning and a deep understanding of the physical world. We empower our students to become critical thinkers, innovative problem solvers, and future leaders in scientific discovery.

Investing in Your Future:

A Physics degree from our college equips you with a versatile skillset that opens doors to a multitude of rewarding careers. Our graduates have gone on to excel in a variety of fields:

- **Research:** Become a leading researcher at universities, government labs, or private research institutions, pushing the boundaries of scientific knowledge.
- **Engineering:** Apply your understanding of physics principles to design innovative technologies that shape the future.
- **Data Science:** Utilize your analytical and problem-solving skills to tackle complex challenges in data-driven fields like finance, healthcare, and artificial intelligence.
- **Education:** Inspire the next generation of scientists by becoming a physics teacher at the high school or college level.
- **Entrepreneurship:** Turn your passion for physics into a business venture by developing innovative products or services based on scientific principles.

- **Course offered: 3 year B.Sc Course**



Our faculty

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- **No of piblications- 3 in international Scopus journal**

Publication details

1. Influence of Ion Beam Irradiation on Optical and Magnetic Properties of Transparent Mn Doped ZnO Thin Films, Suitable for Sensor Applications.
   Swarup Kumar Neogi, Soumyadev Ghosh, Aritra Banerjee,and Sudipta Bandyopadhyay
   DOI 10.1149/2162-8777/ac6895, https://iopscience.iop.org/article/10.1149/2162-8777/ac6895/meta
2. Physical property modifications with transition metal doping in nanostructured Zn1-xNix O (x = 0.03, 0.05); synthesized by chemical co-precipitation technique.
   Soumyadev Ghosh, Subhamay Pramanik, Probodh K. Kuiri , Saikat Samantad Rupam Sen and Swarup Kumar Neogi.
   DOI 10.1088/1742-6596/2349/1/012012 , https://iopscience.iop.org/article/10.1088/1742-6596/2349/1/012012
3. Synthesis of ZnO nanoparticles by co-precipitation technique and characterize the structural and optical properties of these nanoparticles.
   Soumyadev Ghosh, Abhishek Ghosh, Subhamay Pramanik, Probodh K. Kuiri , Rupam Sen , and Swarup Kumar Neogi
   DOI 10.1088/1742-6596/2349/1/012014 , https://iopscience.iop.org/article/10.1088/1742-6596/2349/1/012014

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DEPARTMENT OF PHYSICS
UDAYNARAYANPUR MADHABILATA MAHAVIDYALAYA

Paper: DC-1/MDC Minor-1: BASIC PHYSICS-I **50 Marks / 3 Credits**					
Serial No	**PAPER**	**UNIT**	**TOPIC**	**Mode of Teaching**	**TEACHER**
1.	PAPER: MDC-1/MDC Minor-1: BASIC PHYSICS-I	Unit-1 Mathematical Physics	. Preliminaries: SI system of units, dimensional analysis. Plotting of functions (both cartesian and polar), Limits, Intuitive ideas about continuity and differentiability of a function. Taylor series of one variable and binomial series (statements only); Maxima and minima for functions of one variable. Calculus of functions of more than one variable: Partial derivatives, exact and inexact differentials.	**Hybrid**	**S.G**
2.	PAPER: MDC-1/MDC Minor-1: BASIC PHYSICS-I	Unit-1 Mathematical Physics	. Ordinary Differential Equations: First order linear differential equations and integrating factor. Linear second order homogeneous equations with constant coefficients. Simple harmonic motion as an example	**Hybrid**	**S.G**
3.	PAPER: MDC-1/MDC Minor-1: BASIC PHYSICS-I	Unit I: Mathematical Physics	Vectors: Dot, cross, scalar triple and vector triple products of cartesian vectors. Vector differentiation. Scalar and vector fields --- gradient, divergence, curl and Laplacian (for Cartesian coordinates), solenoidal and irrotational vector	**Hybrid**	**S.G**

			field. Statement of Divergence theorem and Stokes' theorem; application to simple cases. [7 LP]		
4.	PAPER: MDC-1/MDC Minor-1: BASIC PHYSICS-I	Unit 1: Mathematical Physics	4. Curvilinear coordinates: Plane polar, spherical polar and cylindrical polar coordinates: their unit vectors, role of unit vectors as basis vectors. Surface and volume element (from geometry). Line, surface and volume integrals. Form of the gradient operator in curvilinear coordinates. Velocity and acceleration of point particle in Cartesian, plane polar, spherical polar, cylindrical polar coordinates. [6 LP]	**Lecture**	**S. G**
5	PAPER: MDC-1/MDC Minor-1: BASIC PHYSICS-I	Unit 2: Classical Mechanics:	Review of Newton's Laws: Concepts of Inertial frames; force and mass. Galilean transformations and Galilean invariance; Newton's laws of motion, principle of conservation of linear momentum, Simple problems involving motion under resistive forces. Rotational motion: Angular velocity, angular acceleration, angular momentum, torque, principle of conservation of angular momentum. .	**Lecture**	**SG**
6	PAPER: MDC-1/MDC Minor-	Unit 2:	Work Kinetic Energy Theorem.	**Lecture & DEMONSTRATOR**	**S. G**

	1: BASIC PHYSICS-I	Classical Mechanics:	Conservative Forces: Force as the gradient of a scalar field. Concept of potential and potential energy. Other equivalent definitions of a conservative force. Conservation of energy. Qualitative study of one-dimensional motion from potential energy curves. Stable and unstable equilibrium. [4 LP]		
7	PAPER: MDC-1/MDC Minor-1: BASIC PHYSICS-I	Unit 2: Classical Mechanics:	Dynamics of a system of particles: The problem of solving equation of motion; Actionreaction kind of forces and the two body problem; Reduced mass & centre of mass; Properties of the centre of mass; Effect of torque; Linear momentum, angular momentum & total energy of a system of particles. [4 LP]	**Hybrid**	**SG**
7	PAPER: MDC-1/MDC Minor-1: BASIC PHYSICS-I	Unit 2: Classical Mechanics:	Central force: Newton's Law of Gravitation; Kepler's Laws; Conservation of angular momentum, Gauss's law for Gravitation (integral form); Gravitational potential and intensity due to uniform spherical shell , solid sphere of uniform density and infinite flat sheet. Differential equation for the path in a central force field. Motion under an	**Lecture**	**SG**

			inverse square force, calculation of ORBITS.		
8	PAPER: MDC-1/MDC Minor-1: BASIC PHYSICS-I	Unit 2: Classical Mechanics:	(a) Hooke's law, elastic moduli, relation between elastic constants, Poisson's Ratio, Expression for Poisson's ratio in terms of elastic constants. (b) Twisting couple on a cylinder. Determination of Rigidity modulus by static torsion. Torsional pendulum. (c) Bending of beams, Cantilever. (d) Work done in stretching and work done in twisting a wire.	**Lecture**	**S. G**
9	PAPER: MDC-1/MDC Minor-1: BASIC PHYSICS-I	Unit 2: Classical Mechanics:	Scattering: Two body collision and scattering [2 LP]	**Lecture**	**S. G**
10	PAPER: MDC-1/MDC Minor-1: BASIC PHYSICS-I	Unit 2: Classical Mechanics:	Mechanics of Continuum: Kinematics of Moving Fluids: Idea of compressible and incompressible fluids, Equation of continuity; streamline and turbulent flow, Reynold's number. Stokes' law from dimensional analysis; Euler's Equation and the special case of fluid statics. Simple applications (e.g: Pascal's law and Archimedes principle). Bernoulli's Theorem. [6 LP]	**LECTURE**	**SG**
	PAPER: MDC-1/MDC Minor-1: BASIC PHYSICS-I PRACTICAL 30 Marks / 1 Credits				

1	**PAPER: MDC-1/MDC Minor-1: BASIC PHYSICS-I PRACTICAL**		Measurement of the diameter of a wire using screw gauge a number of times and to determine the mean, median, mode & standard deviation for study of random error in observation	**Practical**	**S.G**
2	**PAPER: MDC-1/MDC Minor-1: BASIC PHYSICS-I PRACTICAL**		Measurement of a suitable vertical height using Sextant.	**Practical**	**S.G**
3	**PAPER: MDC-1/MDC Minor-1: BASIC PHYSICS-I PRACTICAL**		Determination of the Moment of Inertia of a metallic cylinder / rectangular rod about an axis passing through its centre of gravity	**Practical**	**S.G**
4	**PAPER: MDC-1/MDC Minor-1: BASIC PHYSICS-I PRACTICAL**		Determination of modulus of rigidity of the material of a suspension wire by dynamical method	**Practical**	**S.G**
5	**PAPER: MDC-1/MDC Minor-1: BASIC PHYSICS-I PRACTICAL**		To determine the coefficient of viscosity of water by Poiseuille's method	**Practical**	**S.G**

PAPER: MDC-2/MDC Minor-2: BASIC PHYSICS - II –□ 50 Marks / 3 Credits					
Serial No	**PAPER**	**UNIT**	**TOPIC**	**Mode of Teaching**	**TEACHER**
1	**PAPER: MDC-2/MDC Minor-2: BASIC PHYSICS – II THEORY**	Unit I: Basic Electricity and Magnetism	Vector Algebra: Addition of vectors and multiplication by a scalar. Scalar and vector products of two vectors	Lecture	SG
2	**PAPER: MDC-2/MDC Minor-2: BASIC PHYSICS – II THEORY**	Unit I Basic Electricity and Magnetism	Electrostatics: Coulomb's law, Electric field, Electric field lines. Superposition Principle. Electric	Lecture.	SG

			flux. Idea of charge density (linear, surface, volume) and continuous charge distributions. Gauss' Law (in integral form) with applications to charge distributions with spherical, cylindrical and planar symmetry. Conservative nature of Electrostatic Field. Introduction to electrostatic potential, Equipotential surfaces. Calculation of potential for linear, surface and volume charge distributions: simple cases (e.g.: uniform line charge, disc, spherical shell, sphere etc). Potential and field due to a physical dipole; Torque, force and Potential Energy of an electric dipole in a uniform electric field. Electrostatic energy of a system of charges, a charged sphere. Conductors in an		

			electrostatic Field. Mechanical force on the surface of a charged conductor. Surface charge and force on a conductor. Capacitance of a system of charged conductors. Capacitance for parallel-plate, cylindrical, spherical capacitors (without dielectrics). Energy stored in the Electrostatic field. [11 LP		
3	**PAPER: MDC-2/MDC Minor-2: BASIC PHYSICS – II THEORY**	Unit 1: Basic Electricity and Magnetism	Lorentz force: Force on a moving charge in simultaneous electric and magnetic fields, force on a current carrying conductor in a magnetic field. Trajectory of charged particles in uniform electric field, crossed uniform electric and magnetic fields. Basic principle of cyclotron. [3 LP]	Lecture & demonstrator	SG
4	**PAPER: MDC-2/MDC Minor-2: BASIC PHYSICS – II THEORY**	Unit 2: Introduction to Thermodynamics	. Magnetostatics: Concept of current density (linear, surface, volume). Equation of continuity. Biot and Savart's law, magnetic field	Lecture.	SG

			due to a straight conductor, circular coil, Helmholtz coil, solenoid. Ampere's circuital law with applications (Infinite long wire, infinite solenoid, infinite current sheet). Magnetic field due to a small current loop - concept of magnetic dipole. Torque and force on magnetic dipole in a uniform magnetic field. [8 LP]		
5	**PAPER: MDC-2/MDC Minor-2: BASIC PHYSICS – II THEORY**	Unit 2: Introduction to Thermodynamics	Divergence of the Electrostatic field, flux, Gauss's theorem of electrostatics, applications of Gauss theorem to find Electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charged sheet, charged conductor. Gauss's theorem in dielectrics	Lecture.	SG
6	**PAPER: MDC-2/MDC Minor-2: BASIC PHYSICS – II THEORY**	Unit 2: Introduction to Thermodynamics	Curl of the Electrostatic Field. Conservative nature of electrostatic field, Introduction to	Lecture.	SG

			electriostatic potential, Calculation of potential for linear, surface and volume charge distributions, potential for a uniformly charged spherical shell and solid sphere. Calculation of electric field from potential. Energy per unit volume in electrostatic field.		
7	**PAPER: MDC-2/MDC Minor-2: BASIC PHYSICS – II THEORY**	Unit 2. Introduction to Thermodynamics	(a) Introduction of magnetostatics through Biot-Savart's law. Application of Biot Savart's law to determine the magnetic field of a straight conductor, circular coil, solenoid carrying current. Force between two straight current carrying wires. Lorentz force law.	Lecture.	SG
PAPER: MDC-2/MDC Minor-2: BASIC PHYSICS – II (Practical) □ 30 Marks / 2 Credits					
1	**PAPER: MDC-2/MDC Minor-2: BASIC PHYSICS – II (Practical**	**Electricity and Magnetism (Practical)**	Conversion of an ammeter to voltmeter and vice versa.	Practical	SG
2	**PAPER: MDC-2/MDC Minor-2: BASIC PHYSICS – II (Practical**	**Electricity and Magnetism (Practical)**	Determination of an unknown low resistance using Carey-Foster's Bridge.	Practical	SG

3	**PAPER: MDC-2/MDC Minor-2: BASIC PHYSICS – II (Practical**	**Electricity and Magnetism (Practical)**	Measurement of current by potentiometer.	Practical	SG
4	**PAPER: MDC-2/MDC Minor-2: BASIC PHYSICS – II (Practical**	**Electricity and Magnetism (Practical)**	Measurement of pressure coefficient of expansion of air by Jolly's apparatus.	Practical	SG
5	**PAPER: MDC-2/MDC Minor-2: BASIC PHYSICS – II (Practical**	**Electricity and Magnetism (Practical)**	Measurement of coefficient of thermal expansion of a metallic rod by optical lever arrangement.	Practical	SG

PHS-G-CC-3-3-TH – Thermal Physics and Statistical Mechanics (Theory)					
Serial No	**PAPER**	**UNIT**	**TOPIC**	**Mode of Teaching**	**TEACHER**
1.	PHS-G-CC-3-3-TH	Laws of Thermodynamics	Thermodynamic Description of system: Zeroth Law of thermodynamics and temperature. First law and internal energy, conversion of heat into work, Various Thermodynamical Processes, Applications of First Law: General Relation between CP and CV , Work Done during Isothermal and Adiabatic Processes. Compressibility and Expansion Coeficients, Reversible and irreversible processes.	PPT	SG
2.	PHS-G-CC-3-3-TH	Laws of Thermodynamics	Climate change with reference to	PPT	SG

			the geological time scale		
3.	PHS-G-CC-3-3-TH	Laws of Thermodynamics	Second law and Entropy, Carnot's cycle & Carnot's theorem, Entropy changes in reversible & irreversible processes, Entropy-temperature diagrams.	PPT	SG
4.	PHS-G-CC-3-3-TH	Thermodynamical Potentials	Enthalpy, Gibbs, Helmholtz and Internal Energy functions, Maxwell's relations and applications: Joule-Thompson Effect, Clausius-Clapeyron Equation, Expression for (CP and CV). TdS equations.	LECTURE	SG
5.	PHS-G-CC-3-3-TH	Kinetic Theory of Gases	Derivation of Maxwell's law of distribution of velocities and its experimental verication, Mean free path (Zeroth Order), Transport Phenomena: Viscosity, Conduction and Diffusion (for vertical case), Law of equipartition of energy (no derivation) and its applications to specific heat of gases; mono-atomic and diatomic gases.	PPT	SG
6.	PHS-G-CC-3-3-TH	Theory of Radiation	Blackbody radiation, Spectral	PPT	SG

			distribution, Concept of Energy Density, Derivation of Planck's law, Deduction of Wien's distribution law, Rayleigh- Jeans Law, Stefan Boltzmann Law and Wien's displacement law from Planck's law.		
7.	PHS-G-CC-3-3-TH	Statistical Mechanics	Phase space, Macrostate and Microstate. Ensemble, Ergodic hypothesis. Entropy and Thermodynamic probability, Boltzmann hypothesis. Maxwell-Boltzmann law of distribution of velocity. Quantum statistics (qualitative discussion only). Fermi-Dirac distribution law (statement only), electron gas as an example of Fermi gas. BoseEinstein distribution law (statement only), photon gas as a	LECTURE	SG
	PHS-G-CC-3-3-P - PHS-G-CC-3-3-P- Thermal Physics and Statistical Mechanics (Practical)				
8.	**PHS-G-CC-3-3-P**	**- Thermal Physics and Statistical Mechanics (Practical)**	Determination of the coefficient of thermal expansion of a metalic rod using an optical lever	Practical	SG

9.	- **PHS-G-CC-3-3-P**	**- Thermal Physics and Statistical Mechanics (Practical)**	Verication of Stefan's law of radiation by the measurement of voltage and current of a torch bulb glowing it beyond draper point.	Practical	SG
10.	**PHS-G-CC-3-3-P**	**- Thermal Physics and Statistical Mechanics (Practical)**	To determine Thermal coefficient of Resistance using Carey forster bridge.	Practical	SG
11.	**PHS-G-CC-3-3-P**	**- Thermal Physics and Statistical Mechanics (Practical)**	To determine the Coefficient of Thermal Conductivity of a bad conductor by Lee and Charlton's disc method.	Practical	SG
12.	**PHS-G-CC-3-3-P**	**- Thermal Physics and Statistical Mechanics (Practical)**	Determination of the pressure coefficient of air using Jolly's apparatus.	Practical	SG

PHS-G-CC-4-4-TH– Waves and Optics (Theory) 50 Marks / 4 Credits					
Serial No	**PAPER**	**UNIT**	**TOPIC**	**Mode of Teaching**	**TEACHER**
1.	**PHS-G-CC-4-4-TH– Waves and Optics**	Unit I: . . Accoustics	Review of SHM, damped & forced vibrations: amplitude and velocity resonance. Fourier's Theorem amd its application for some waveforms e.g., Saw tooth wave, triangular wave, square wave. Intensity and loudness of sound. Intensity levels, Decibels.	Lecture	SG

2.	**PHS-G-CC-4-4-TH– Waves and Optics**	UnIT-2: Superposition of vibrations	Superposition of Two Collinear Harmonic oscillations having equal frequencies and different frequencies	Lecture	SG
3.	**PHS-G-CC-4-4-TH– Waves and Optics**	Unit 2: Superposition of vibrations	Superposition of Two Perpendicular Harmonic Oscillation for phase difference $\delta = 0, \pi\ 2\ , \pi$: Graphical and Analytical Methods, Lissajous Figures with equal and unequal frequency and their uses.	Lecture	SG
4.	**PHS-G-CC-4-4-TH– Waves and Optics**	Unit 3. Vibrations in String	(a) Wave equation in streched string and its solutions. Boundary conditions for plucked and struck strings. Expression of amplitude for both the cases (no derivation), Young's law, Ideal of harmonics. Musical scales and notes.	Lecture	SG
5.	**PHS-G-CC-4-4-TH– Waves and Optics**	Unit 4. Introduction to wave Optics	Definition and Properties of wave front. Huygens Principle, Electromagnetic nature of light	Lecture	SG
6.	**PHS-G-CC-4-4-TH– Waves and Optics**	Unit 5: Interference	Superposition of two waves with phase difference,	Lecture	SG

			distribution of energy, formation of fringes, visibility of fringes.Division of amplitude and division of wavefront. Young's Double Slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stoke's treatment. Interference in Thin Films: parallel and wedgeshaped lms. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: measurement of wavelength and refractive index. Michelson's Interferometer (a) Idea of form of fringes (no theory needed), Determination of wavelength, Wavelength dierence, Refractive index.		
7.	**PHS-G-CC-4-4-TH– Waves and Optics**	Unit 6. Diffraction	Fraunhofer diffraction Single slit; Double Slit. Multiple slits and Diffraction grating.	Lecture	SG

8.	**PHS-G-CC-4-4-TH– Waves and Optics**	Unit 6. Diffraction	Fresnel Diraction: Half-period zones. Zone plate.	Lecture	SG
9.	**PHS-G-CC-4-4-TH– Waves and Optics**	Unit 7. Polarization	Transverse nature of light waves. Plane polarized light, production and analysis. Circular and elliptical polarization. Optical ac	Lecture	SG
	PHS-G-CC-4-4-P – Waves and Optics (Practical) □ **30 Marks / 2 Credits**				
	PHS-G-CC-4-4-P	Waves and Optics (Practical)	Determination of the focal length of a concave lens by auxiliary lens method.	Practical	SG
	PHS-G-CC-4-4-P	Waves and Optics (Practical)	Determination of the frequency of a tuning fork with the help of sonometer.	Practical	SG
	PHS-G-CC-4-4-P	Waves and Optics (Practical)	Determination of radius of curvature of plano convex lens/wavelength of a monochromatic or quasi monochromatic light using Newtons ring.	Practical	SG
	PHS-G-CC-4-4-P	Waves and Optics (Practical)	Measurement of thickness of a paper from a wedge shaped film.	Practical	SG
	PHS-G-CC-4-4-P	Waves and Optics (Practical)	Measurement of specific rotation of active solution (e.g., sugar solution) using polarimeter.	Practical	SG

PHS-G-DSE-A-TH – Analog Electronics (Theory) □ 50 Marks / 4 Credits					
Serial No	**PAPER**	**UNIT**	**TOPIC**	**Mode of Teaching**	**TEACHER**
1	**PHS-G-DSE-A-TH – Analog Electronics**	Unit 1. Circuits and Network	Discrete components, Active & Passive components, Ideal Constant voltage and Constant current Sources. Network Theorems: Thevenin theorem, Norton theorem, Superposition theorem, Reciprocity theorem, Maximum Power Transfer theorem. Applications to dc circuits.	Lecture	SG
2	**PHS-G-DSE-A-TH – Analog Electronics**	UnIT-2: Semiconductor Devices	(a) Semiconductor Diodes: P and N type semiconductors. Barrier Formation in PN Junction Diode. Qualitative Idea of Current Flow Mechanism in Forward and Reverse Biased Diode. PN junction and its characteristics. Static and Dynamic Resistance. Principle and structure of • Light Emitting Diode • Photo Diode • Solar Cell (b) Application of Diode: Half-wave Rectifiers. Centre-tapped and Bridge Full-	Lecture	SG

			wave Rectifiers, Ripple Factor and Rectification Eciency. Basic idea about capacitor filter. (b) Zener Diode and Voltage Regulation. (c) Bipolar Junction transistors: n-p-n and p-n-p Transistors. Characteristics of CB, CE and CC Congurations. Active, Cut-off & Saturation regions. Current gains α and β. Relations between them. Load Line analysis of Transistors. DC Load line & Q-point. Voltage Divider Bias Circuit for CE Amplier. Class A, B & C Ampliers.		
3	**PHS-G-DSE-A-TH – Analog Electronics**	Unit 3. Regulated Power Supply	Difference between regulated and unregulated power supply. Load regulation and line regulation. Zener as voltage regulator. Principle of series regulated power supply, IC controlled regulated power supply.	Lecture	SG
4	**PHS-G-DSE-A-TH – Analog Electronics**	Unit 4. Field Effect transistors	Construction, operation, characteristics,and parameters of junction FET. MOSFET (both depletion and	Lecture	SG

			enhancement type) as a part of MISFET. Basic structure & principle of operations and their characteristics. Pinch off, threshold voltage and short channel effect. Comparison of JFFET and MOSFET.		
5	**PHS-G-DSE-A-TH – Analog Electronics**	Unit 4. Feedback Amplifiers	Necessity of negative feedback for stability. Voltage series, voltage shunt, current series and current shunt feedback. Change in input impedance, output impedence, voltage gain for a voltage series feedback in a voltage amplifer.	Lecture	SG
6	**PHS-G-DSE-A-TH – Analog Electronics**	Unit 5: Operational Ampliers	(a) Characteristics of an Ideal and Practical Op-Amp (IC 741), Open loop and closed loop Gain. CMRR, concept of Virtual ground. Applications of Op-Amps • Inverting and non-inverting Ampliers • Inverting Adder • Subtractor • Differentiator • Integrator • Zero crossing detector	PPT	SG
7	**PHS-G-DSE-A-TH – Analog Electronics**	Unit 6. Sinusoidal Oscillators:	Barkhausen's Criterion for Self-sustained Oscillations. Wien bridge oscillator.	Lecture	SG
	PHS-G-DSE-A-P – Analog Electronics (Practical) □ **30 Marks / 2 Credits**				
1	PHS-G-DSE-A-P	Analog Electronics (Practical)	. Veryfication of Thevenin and Norton's theorem, super position theorem and	Practical	SG

			maximum power transfer theorem for resistive network fed by D.C. power supply.		
2	PHS-G-DSE-A-P	Analog Electronics (Practical)	Study the emitter characteristics of a photo transistor illuminated by LED.	Practical	SG
3	PHS-G-DSE-A-P	Analog Electronics (Practical)	TO study the characteristics of a Transistor in CE conguration.	Practical	SG
4	PHS-G-DSE-A-P	Analog Electronics (Practical)	Construction of a regulated power supply using LM 317 IC.	Practical	SG
5	PHS-G-DSE-A-P	Analog Electronics (Practical)	To study OPAMP: inverting amplifer, non inverting amplier, adder, subtractor.	Practical	SG

PHS-G-DSE-B-TH– Digital Electronics (Theory) □ 50 Marks / 4 Credits					
Serial No	**PAPER**	**UNIT**	**TOPIC**	**Mode of Teaching**	**TEACHER**
1	**PHS-G-DSE-B-TH– Digital Electronics (Theory)**	Unit 1 Integrated Circuits	Principle of Design of monolithic Chip. Advantages and drawbacks of ICs. Scale of integration: SSI, MSI, LSI and VLSI (basic idea and definitions only w.r.t. micron/submicron feature length).	Lecture	SG
2	**PHS-G-DSE-B-TH– Digital Electronics (Theory)**	Unit-2: Number System	Binary Numbers. Decimal to Binary and Binary to Decimal Conversion. BCD, Octal and Hexadecimal numbers. Signed and unsigned number representation	Lecture	SG

			of binary system. Binary addition, Representation of negative number. 1's Complement and 2's Complement method of subtraction.		
3	**PHS-G-DSE-B-TH– Digital Electronics (Theory)**	Unit 3. Digital Circuits	(a) Difference between Analog and Digital Circuits. (b) AND, OR and NOT Gates (Realization using Diodes and Transistor). NAND and NOR Gates as Universal Gates. XOR and XNOR Gates. De Morgan's Theorems. (c) Switching algebra, Simplication of logical expression using switching Algebra. Fundamental Products and sum term (p term and s term). Minterms and Maxterms. Conversion of a Truth Table into an algebraic expression in (1) Sum of Products form and (2) Product of sum term form. Implementation of a truth table by NAND or NOR gate. Simplification of algebraic expression from truth table using Karnaugh Map	Lecture	SG
4	**PHS-G-DSE-B-TH– Digital Electronics (Theory)**	Unit 4. Data processing circuits	Basic idea of Multiplexers, De-multiplexers, Decoders, Encoders.	Lecture	SG

5	**PHS-G-DSE-B-TH– Digital Electronics (Theory)**	Unit 5. Sequential Circuits:	Introduction to Next state present state table, excitation table and truth table for Sequential circuits. SR, D, and JK Flip-Flops. Clocked (Level and Edge Triggered) Flip-Flops. Preset and Clear operations. Race condition in SR and Race-around conditions in JK Flip-Flop. M/S JK Flip-Flop, T type FF.	Lecture	SG
6	**PHS-G-DSE-B-TH– Digital Electronics (Theory)**	Unit 6: Registers and Counters	(a) Shift registers: Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serial-out and Parallel-in-Parallel-out Shift Registers (only up to 4 bits). (b) Counters (4 bits): Asynchronous counters: ripple counter, Decade Counter. Synchronous Counter, Ring counter.	PPT	SG
	PHS-G-DSE-B-P– Digital electronics (Practical)□ **30 Marks / 2 Credits**				
	PHS-G-DSE-B-P	Digital electronics (Practical)	To verify and design AND, OR, NOT and XOR gates using NAND gates	Practical	SG
	PHS-G-DSE-B-P	Digital electronics (Practical)	Construction of half adder, and full adder using NAND/NOR gate.	Practical	SG
	PHS-G-DSE-B-P	Digital electronics (Practical)	Construction of SR, D FF circuits using NAND gates.	Practical	SG
	PHS-G-DSE-B-P	Digital electronics (Practical)	Construction of 4 bit shift registers (serial & parallel) using D type FF IC 7476.	Practical	SG

	PHS-G-DSE-B-P	Digital electronics (Practical)	Construction of 4 × 1 Multiplexer using IC 74151.	Practical	SG

Sd/

Soumyadev Ghosh
Dept. of Physics

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DEPARTMENT OF PHYSICS
UDAYNARAYANPUR MADHABILATA MAHAVIDYALAYA

Paper: PHS-G-CC-1-1-TH Mechanics **50 Marks / 4 Credits**					
Serial No	**PAPER**	**UNIT**	**TOPIC**	**Mode of Teaching**	**TEACHER**
1.	Paper: PHS-G-CC-1-1-TH Mechanics	Unit-1 Mathematical Methods	Vector Algebra	**Hybrid**	**S.G**
2.	Paper: PHS-G-CC-1-1-TH Mechanics	Unit-1 Mathematical Methods	Vector Analysis	**Hybrid**	**S.G**
3.	Paper: PHS-G-CC-1-1-TH Mechanics	Unit I: Mathematical Methods	Ordinary Differential Equations:	**Hybrid**	**S.G**
4.	Paper: PHS-G-CC-1-1-TH Mechanics	Unit 2: Laws of Motion	Laws of Motion	**Lecture**	**S. G**
5	Paper: PHS-G-CC-1-1-TH Mechanics	Unit 2: Laws of Motion	Work-energy theorem.	**Lecture**	**SG**
6	Paper: PHS-G-CC-1-1-TH Mechanics	Unit 3: Rotational Motion	Rotation of a rigid body about a fixed axis. Angular velocity and angular momentum. Moment of Inertia. Calculation of moment of inertia for rectangular, cylindrical and spherical bodies. Torque. Conservation of angular momentum	**Lecture & DEMONSTRATOR**	**S. G**
7	Paper: PHS-G-CC-1-1-TH Mechanics	Unit 4: Central force and Gravitation	(a) Motion of a particle in a central force field. Conservation of angular momentum leading to restriction of the motion to a plane and constancy of areal velocity. Kepler's Laws (statement only). Newton's Law of Gravitation. Satellite in circular orbit and applications. Geosynchronous orbits. Basic idea of	**Hybrid**	**SG**

			global positioning system (GPS)		
7	Paper: PHS-G-CC-1-1-TH Mechanics	Unit 5: Oscillations	Simple harmonic motion. Differential equation of SHM and its solutions. Kinetic and Potential Energy, Total Energy and their time averages. Damped oscillations. Forced oscillations with harmonic forces	**Lecture**	**SG**
8	Paper: PHS-G-CC-1-1-TH Mechanics	Unit 6: Elasticity	(a) Hooke's law, elastic moduli, relation between elastic constants, Poisson's Ratio, Expression for Poisson's ratio in terms of elastic constants. (b) Twisting couple on a cylinder. Determination of Rigidity modulus by static torsion. Torsional pendulum. (c) Bending of beams, Cantilever. (d) Work done in stretching and work done in twisting a wire.	**Lecture**	**S. G**
9	Paper: PHS-G-CC-1-1-TH Mechanics	Unit 7: Surface Tension	Molecular theory of surface tension, surface energy, comparison between surface tension and surface energy, variation of surface tension with temperature, application to spherical drops and bubbles Synclastic and anticlastic surface, excess of pressure, capilary rise of liquid.	**Lecture**	**S. G**
	PHS-G-CC-1-1-P – 1.1.2 Mechanics (Practical) □ 30 Marks / 2 Credits				

1	PHS-G-CC-1-1-P		Determination of Moment of inertia of cylinder/bar about axis by measuring the time period, of the cradle and with body of known moment of Inertia.	Practical	S.G
2	PHS-G-CC-1-1-P		Determination of Y modulus of a metal bar of rectangular cross section by the method of exure.	Practical	S.G
3	PHS-G-CC-1-1-P		Determination of rigidity modulus of wire by measuring the time period of torsional oscillation of a metal cylinder attached to it.	Practical	S.G
4	PHS-G-CC-1-1-P		Determination of Moment of Inertia of a flywheel.	Practical	S.G
5	PHS-G-CC-1-1-P		Determination gravitational acceleration, g using bar pendulum.	Practical	S.G

PHS-G-CC-2-2-TH_ Electricity and Magnetism – **50 Marks / 4 Credits**					
Serial No	**PAPER**	**UNIT**	**TOPIC**	**Mode of Teaching**	**TEACHER**
8.	PHS-G-CC-2-2-TH_ Electricity and Magnetism	Unit I: Essential Vector Analysis	Vector Algebra: Addition of vectors and multiplication by a scalar. Scalar and vector products of two vectors	Lecture	SG
9.	PHS-G-CC-2-2-TH_ Electricity and Magnetism	Unit I: Essential Vector Analysis	Vector Analysis: Gradient, divergence and Curl. Vector integration, line, surface and volume integrals of vector fields. Gauss' divergence theorem and	Lecture.	SG

			Stoke's theorem of vectors (Statement only) and their significances.		
10.	PHS-G-CC-2-2-TH_ Electricity and Magnetism	Unit 2: Electrostatics	Coulombs law, principle of superposition, electrostatic field. Electric field and charge density, surface and volume chargev density, charge density on the surface of a conductor. Force per unit area on the surface.	Lecture & demonstrator	SG
11.	PHS-G-CC-2-2-TH_ Electricity and Magnetism	Unit 2: Electrostatics	Electric dipole moment, electric potential and field due to an electric dipole, force and Torque on a dipole. Electric Fields inside matter, Electric Polarisation, bound charges, displacement density vector, linear Dielectric medium, electric Succeptibility and Permittivity.	Lecture.	SG
12.	PHS-G-CC-2-2-TH_ Electricity and Magnetism	Unit 2: Electrostatics	Divergence of the Electrostatic field, flux, Gauss's theorem of electrostatics, applications of Gauss theorem to find Electric field due to point charge, infinite line of charge, uniformly charged	Lecture.	SG

			spherical shell and solid sphere, plane charged sheet, charged conductor. Gauss's theorem in dielectrics		
13.	PHS-G-CC-2-2-TH_ Electricity and Magnetism	Unit 2: Electrostatics	Curl of the Electrostatic Field. Conservative nature of electrostatic field, Introduction to electriostatic potential, Calculation of potential for linear, surface and volume charge distributions, potential for a uniformly charged spherical shell and solid sphere. Calculation of electric field from potential. Energy per unit volume in electrostatic field.	Lecture.	SG
14.	PHS-G-CC-2-2-TH_ Electricity and Magnetism	Unit 3. Magnetism	(a) Introduction of magnetostatics through Biot-Savart's law. Application of Biot Savart's law to determine the magnetic field of a straight conductor, circular coil, solenoid carrying current. Force between two straight current	Lecture.	SG

			carrying wires. Lorentz force law.		
15.	PHS-G-CC-2-2-TH_ Electricity and Magnetism	Unit 3. Magnetism	Divergence of the magnetic field, Magnetic vector potential	Lecture.	SG
16.	PHS-G-CC-2-2-TH_ Electricity and Magnetism	Unit 3. Magnetism	Curl of the magnetic field. Ampere's circuital law. Determination of the magnetic field of a straight current carrying wire. Potential and field due to a magnetic dipole. Magnetic dipole moment. Force and torque on a magnetic dipole	Lecture.	SG
17.	PHS-G-CC-2-2-TH_ Electricity and Magnetism	Unit 3. Magnetism	Magnetic fields inside matter, magnetization, Bound currents. The magnetic intensity H. Linear media. Magnetic susceptibility and Permeability. Brief introduction of dia, para and ferro-magnetic materials.	Hybrid	SG
18.	PHS-G-CC-2-2-TH_ Electricity and Magnetism	Unit 4:	Faraday's laws of electromagnetic induction, Lenz's law, self and mutual inductance, L of single coil, M of two coils.	Lecture.	SG
19.	PHS-G-CC-2-2-TH_ Electricity and Magnetism	Unit 5:	Maxwell's Equations, Equation of continuity of current, Displacement	Lecture	SG

			current, electromagnetic wave propagation through vacuum and isotropic dielectric medium, transverse nature of EM waves, Poynting vector, decay of charge in conducting medium.		
PHS-G-CC-2-2-P –Electricity and Magnetism (Practical) □ 30 Marks / 2 Credits					
1	**PHS-G-CC-2-2-P –Electricity and Magnetism (Practical)**	**Electricity and Magnetism (Practical)**	Determination of unknown resistance by Carey Foster method.	Practical	SG
2	**PHS-G-CC-2-2-P –Electricity and Magnetism (Practical)**	**Electricity and Magnetism (Practical)**	Measurement of a current flowing through a register using potentiometer	Practical	SG
3	**PHS-G-CC-2-2-P –Electricity and Magnetism (Practical)**	**Electricity and Magnetism (Practical)**	Determination of the horizontal components of earth's magnetic field.	Practical	SG
4	**PHS-G-CC-2-2-P –Electricity and Magnetism (Practical)**	**Electricity and Magnetism (Practical)**	Conversion of an ammeter to a voltmeter.	Practical	SG
5	**PHS-G-CC-2-2-P –Electricity and Magnetism (Practical)**	**Electricity and Magnetism (Practical)**	Conversion of a voltmeter to an Ammeter	Practical	SG

PHS-G-CC-3-3-TH – Thermal Physics and Statistical Mechanics (Theory)					
Serial No	**PAPER**	**UNIT**	**TOPIC**	**Mode of Teaching**	**TEACHER**
13.	PHS-G-CC-3-3-TH	Laws of Thermodynamics	Thermodynamic Description of system: Zeroth Law of thermodynamics and temperature. First law and	PPT	SG

			internal energy, conversion of heat into work, Various Thermodynamical Processes, Applications of First Law: General Relation between CP and CV , Work Done during Isothermal and Adiabatic Processes. Compressibility and Expansion Coeficients, Reversible and irreversible processes.		
14.	PHS-G-CC-3-3-TH	Laws of Thermodynamics	Climate change with reference to the geological time scale	PPT	SG
15.	PHS-G-CC-3-3-TH	Laws of Thermodynamics	Second law and Entropy, Carnot's cycle & Carnot's theorem, Entropy changes in reversible & irreversible processes, Entropy-temperature diagrams.	PPT	SG
16.	PHS-G-CC-3-3-TH	Thermodynamical Potentials	Enthalpy, Gibbs, Helmholtz and Internal Energy functions, Maxwell's relations and applications: Joule-Thompson Effect, Clausius-Clapeyron Equation, Expression for (CP and CV). TdS equations.	LECTURE	SG
17.	PHS-G-CC-3-3-TH	Kinetic Theory of Gases	Derivation of Maxwell's law of distribution of	PPT	SG

			velocities and its experimental verication, Mean free path (Zeroth Order), Transport Phenomena: Viscosity, Conduction and Diffusion (for vertical case), Law of equipartition of energy (no derivation) and its applications to specific heat of gases; mono-atomic and diatomic gases.		
18.	PHS-G-CC-3-3-TH	Theory of Radiation	Blackbody radiation, Spectral distribution, Concept of Energy Density, Derivation of Planck's law, Deduction of Wien's distribution law, Rayleigh- Jeans Law, Stefan Boltzmann Law and Wien's displacement law from Planck's law.	PPT	SG
19.	PHS-G-CC-3-3-TH	Statistical Mechanics	Phase space, Macrostate and Microstate. Ensemble, Ergodic hypothesis. Entropy and Thermodynamic probability, Boltzmann hypothesis. Maxwell-Boltzmann law of distribution of velocity.	LECTURE	SG

			Quantum statistics (qualitative discussion only). Fermi-Dirac distribution law (statement only), electron gas as an example of Fermi gas. BoseEinstein distribution law (statement only), photon gas as a		
	PHS-G-CC-3-3-P - PHS-G-CC-3-3-P- Thermal Physics and Statistical Mechanics (Practical)				
20.	**PHS-G-CC-3-3-P**	**- Thermal Physics and Statistical Mechanics (Practical)**	Determination of the coefficient of thermal expansion of a metalic rod using an optical lever	Practical	SG
21.	**- PHS-G-CC-3-3-P**	**- Thermal Physics and Statistical Mechanics (Practical)**	Verication of Stefan's law of radiation by the measurement of voltage and current of a torch bulb glowing it beyond draper point.	Practical	SG
22.	**PHS-G-CC-3-3-P**	**- Thermal Physics and Statistical Mechanics (Practical)**	To determine Thermal coefficient of Resistance using Carey forster bridge.	Practical	SG
23.	**PHS-G-CC-3-3-P**	**- Thermal Physics and Statistical Mechanics (Practical)**	To determine the Coefficient of Thermal Conductivity of a bad conductor by Lee and Charlton's disc method.	Practical	SG
24.	**PHS-G-CC-3-3-P**	**- Thermal Physics and Statistical Mechanics (Practical)**	Determination of the pressure coefficient of air using Jolly's apparatus.	Practical	SG

PHS-G-CC-4-4-TH– Waves and Optics (Theory) □ 50 Marks / 4 Credits					
Serial No	**PAPER**	**UNIT**	**TOPIC**	**Mode of Teaching**	**TEACHER**
10.	**PHS-G-CC-4-4-TH– Waves and Optics**	Unit I: . . Accoustics	Review of SHM, damped & forced vibrations: amplitude and velocity resonance. Fourier's Theorem amd its application for some waveforms e.g., Saw tooth wave, triangular wave, square wave. Intensity and loudness of sound. Intensity levels, Decibels.	Lecture	SG
11.	**PHS-G-CC-4-4-TH– Waves and Optics**	UnIT-2: Superposition of vibrations	Superposition of Two Collinear Harmonic oscillations having equal frequencies and different frequencies	Lecture	SG
12.	**PHS-G-CC-4-4-TH– Waves and Optics**	Unit 2: Superposition of vibrations	Superposition of Two Perpendicular Harmonic Oscillation for phase difference δ = 0, π 2 , π: Graphical and Analytical Methods, Lissajous Figures with equal and unequal frequency and their uses.	Lecture	SG
13.	**PHS-G-CC-4-4-TH– Waves and Optics**	Unit 3. Vibrations in String	(a) Wave equation in streched string and its solutions. Boundary conditions for plucked and	Lecture	SG

			struck strings. Expression of amplitude for both the cases (no derivation), Young's law, Ideal of harmonics. Musical scales and notes.		
14.	**PHS-G-CC-4-4-TH– Waves and Optics**	Unit 4. Introduction to wave Optics	Definition and Properties of wave front. Huygens Principle, Electromagnetic nature of light	Lecture	SG
15.	**PHS-G-CC-4-4-TH– Waves and Optics**	Unit 5: Interference	Superposition of two waves with phase difference, distribution of energy, formation of fringes, visibility of fringes.Division of amplitude and division of wavefront. Young's Double Slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stoke's treatment. Interference in Thin Films: parallel and wedgeshaped lms. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings:	Lecture	SG

			measurement of wavelength and refractive index. Michelson's Interferometer (a) Idea of form of fringes (no theory needed), Determination of wavelength, Wavelength dierence, Refractive index.		
16.	**PHS-G-CC-4-4-TH– Waves and Optics**	Unit 6. Diffraction	Fraunhofer diffraction Single slit; Double Slit. Multiple slits and Diffraction grating.	Lecture	SG
17.	**PHS-G-CC-4-4-TH– Waves and Optics**	Unit 6. Diffraction	Fresnel Diraction: Half-period zones. Zone plate.	Lecture	SG
18.	**PHS-G-CC-4-4-TH– Waves and Optics**	Unit 7. Polarization	Transverse nature of light waves. Plane polarized light, production and analysis. Circular and elliptical polarization. Optical ac	Lecture	SG
	PHS-G-CC-4-4-P – Waves and Optics (Practical) □ **30 Marks / 2 Credits**				
	PHS-G-CC-4-4-P	Waves and Optics (Practical)	Determination of the focal length of a concave lens by auxiliary lens method.	Practical	SG
	PHS-G-CC-4-4-P	Waves and Optics (Practical)	Determination of the frequency of a tuning fork with the help of sonometer.	Practical	SG
	PHS-G-CC-4-4-P	Waves and Optics (Practical)	Determination of radius of curvature of plano convex lens/wavelength of a	Practical	SG

			monochromatic or quasi monochromatic light using Newtons ring.		
	PHS-G-CC-4-4-P	Waves and Optics (Practical)	Measurement of thickness of a paper from a wedge shaped film.	Practical	SG
	PHS-G-CC-4-4-P	Waves and Optics (Practical)	Measurement of specific rotation of active solution (e.g., sugar solution) using polarimeter.	Practical	SG

PHS-G-DSE-A-TH – Analog Electronics (Theory) □ 50 Marks / 4 Credits					
Serial No	**PAPER**	**UNIT**	**TOPIC**	**Mode of Teaching**	**TEACHER**
1	**PHS-G-DSE-A-TH – Analog Electronics**	Unit 1. Circuits and Network	Discrete components, Active & Passive components, Ideal Constant voltage and Constant current Sources. Network Theorems: Thevenin theorem, Norton theorem, Superposition theorem, Reciprocity theorem, Maximum Power Transfer theorem. Applications to dc circuits.	Lecture	SG
2	**PHS-G-DSE-A-TH – Analog Electronics**	UnIT-2: Semiconductor Devices	(b) Semiconductor Diodes: P and N type semiconductors. Barrier Formation in PN Junction Diode. Qualitative Idea of Current Flow	Lecture	SG

			Mechanism in Forward and Reverse Biased Diode. PN junction and its characteristics. Static and Dynamic Resistance. Principle and structure of • Light Emitting Diode • Photo Diode • Solar Cell (b) Application of Diode: Half-wave Rectifiers. Centre-tapped and Bridge Full-wave Rectifiers, Ripple Factor and Rectification Eciency. Basic idea about capacitor filter. (b) Zener Diode and Voltage Regulation. (c) Bipolar Junction transistors: n-p-n and p-n-p Transistors. Characteristics of CB, CE and CC Congurations. Active, Cut-off & Saturation regions. Current gains α and β. Relations between them. Load Line analysis of Transistors. DC Load line & Q-point. Voltage Divider Bias Circuit for CE		

			Amplier. Class A, B & C Ampliers.		
3	**PHS-G-DSE-A-TH – Analog Electronics**	Unit 3. Regulated Power Supply	Difference between regulated and unregulated power supply. Load regulation and line regulation. Zener as voltage regulator. Principle of series regulated power supply, IC controlled regulated power supply.	Lecture	SG
4	**PHS-G-DSE-A-TH – Analog Electronics**	Unit 4. Field Effect transistors	Construction, operation, characteristics,and parameters of junction FET. MOSFET (both depletion and enhancement type) as a part of MISFET. Basic structure & principle of operations and their characteristics. Pinch off, threshold voltage and short channel effect. Comparison of JFFET and MOSFET.	Lecture	SG
5	**PHS-G-DSE-A-TH – Analog Electronics**	Unit 4. Feedback Amplifiers	Necessity of negative feedback for stability. Voltage series, voltage shunt, current series and current shunt feedback. Change in input impedance, output impedence, voltage gain for a voltage series feedback in a voltage amplifer.	Lecture	SG
6	**PHS-G-DSE-A-TH – Analog Electronics**	Unit 5: Operational Ampliers	(a) Characteristics of an Ideal and Practical Op-Amp (IC 741), Open loop and closed loop Gain. CMRR, concept of	PPT	SG

			Virtual ground. Applications of Op-Amps • Inverting and non-inverting Ampliers • Inverting Adder • Subtractor • Differentiator • Integrator • Zero crossing detector		
7	**PHS-G-DSE-A-TH – Analog Electronics**	Unit 6. Sinusoidal Oscillators:	Barkhausen's Criterion for Self-sustained Oscillations. Wien bridge oscillator.	Lecture	SG
	PHS-G-DSE-A-P – Analog Electronics (Practical) □ **30 Marks / 2 Credits**				
1	PHS-G-DSE-A-P	Analog Electronics (Practical)	. Veryfication of Thevenin and Norton's theorem, super position theorem and maximum power transfer theorem for resistive network fed by D.C. power supply.	Practical	SG
2	PHS-G-DSE-A-P	Analog Electronics (Practical)	Study the emitter characteristics of a photo transistor illuminated by LED.	Practical	SG
3	PHS-G-DSE-A-P	Analog Electronics (Practical)	TO study the characteristics of a Transistor in CE conguration.	Practical	SG
4	PHS-G-DSE-A-P	Analog Electronics (Practical)	Construction of a regulated power supply using LM 317 IC.	Practical	SG
5	PHS-G-DSE-A-P	Analog Electronics (Practical)	To study OPAMP: inverting amplifer, non inverting amplier, adder, subtractor.	Practical	SG

PHS-G-DSE-B-TH– Digital Electronics (Theory) □ 50 Marks / 4 Credits					
Serial No	**PAPER**	**UNIT**	**TOPIC**	**Mode of Teaching**	**TEACHER**
1	**PHS-G-DSE-B-TH– Digital**	Unit 1 Integrated Circuits	Principle of Design of monolithic Chip. Advantages and	Lecture	SG

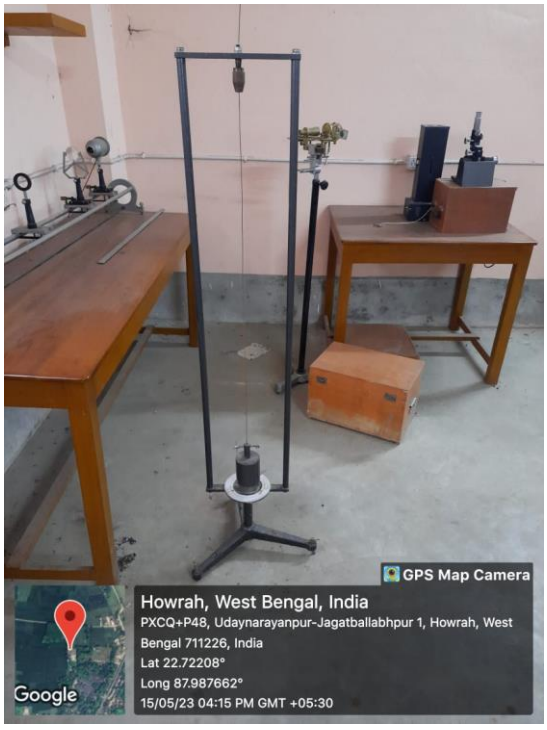
	Electronics (Theory)		drawbacks of ICs. Scale of integration: SSI, MSI, LSI and VLSI (basic idea and definitions only w.r.t. micron/submicron feature length).		
2	**PHS-G-DSE-B-TH– Digital Electronics (Theory)**	Unit-2: Number System	Binary Numbers. Decimal to Binary and Binary to Decimal Conversion. BCD, Octal and Hexadecimal numbers. Signed and unsigned number representation of binary system. Binary addition, Representation of negative number. 1's Complement and 2's Complement method of subtraction.	Lecture	SG
3	**PHS-G-DSE-B-TH– Digital Electronics (Theory)**	Unit 3. Digital Circuits	(a) Difference between Analog and Digital Circuits. (b) AND, OR and NOT Gates (Realization using Diodes and Transistor). NAND and NOR Gates as Universal Gates. XOR and XNOR Gates. De Morgan's Theorems. (c) Switching algebra, Simplication of logical expression using switching Algebra. Fundamental Products and sum term (p term and s	Lecture	SG

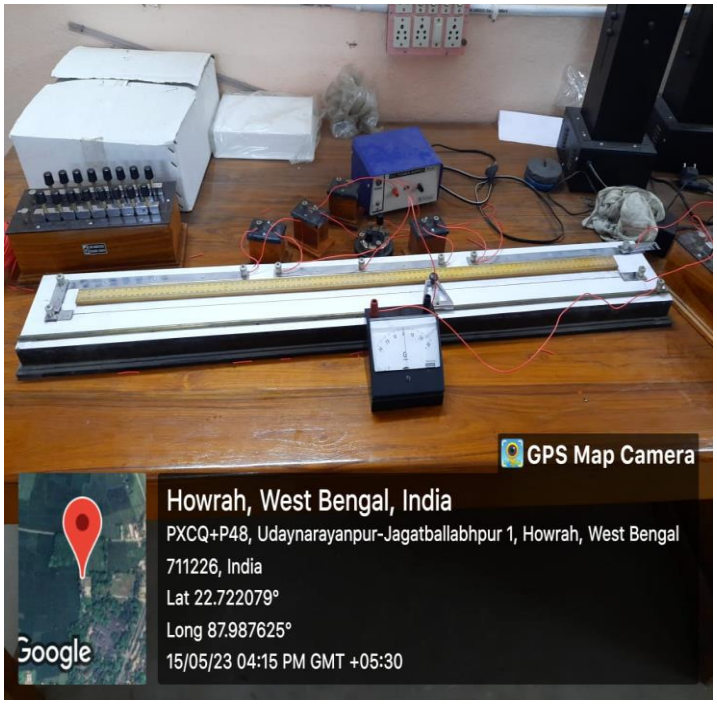
			term). Minterms and Maxterms. Conversion of a Truth Table into an algebraic expression in (1) Sum of Products form and (2) Product of sum term form. Implementation of a truth table by NAND or NOR gate. Simplification of algebraic expression from truth table using Karnaugh Map		
4	**PHS-G-DSE-B-TH– Digital Electronics (Theory)**	Unit 4. Data processing circuits	Basic idea of Multiplexers, De-multiplexers, Decoders, Encoders.	Lecture	SG
5	**PHS-G-DSE-B-TH– Digital Electronics (Theory)**	Unit 5. Sequential Circuits:	Introduction to Next state present state table, excitation table and truth table for Sequential circuits. SR, D, and JK Flip-Flops. Clocked (Level and Edge Triggered) Flip-Flops. Preset and Clear operations. Race condition in SR and Race-around conditions in JK Flip-Flop. M/S JK Flip-Flop, T type FF.	Lecture	SG
6	**PHS-G-DSE-B-TH– Digital Electronics (Theory)**	Unit 6: Registers and Counters	(a) Shift registers: Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serial-out and Parallel-in-Parallel-out Shift Registers (only up to 4 bits). (b) Counters (4 bits): Asynchronous counters: ripple counter, Decade Counter. Synchronous	PPT	SG

			Counter, Ring counter.		
	PHS-G-DSE-B-P– Digital electronics (Practical)□ **30 Marks / 2 Credits**				
	PHS-G-DSE-B-P	Digital electronics (Practical)	To verify and design AND, OR, NOT and XOR gates using NAND gates	Practical	SG
	PHS-G-DSE-B-P	Digital electronics (Practical)	Construction of half adder, and full adder using NAND/NOR gate.	Practical	SG
	PHS-G-DSE-B-P	Digital electronics (Practical)	Construction of SR, D FF circuits using NAND gates.	Practical	SG
	PHS-G-DSE-B-P	Digital electronics (Practical)	Construction of 4 bit shift registers (serial & parallel) using D type FF IC 7476.	Practical	SG
	PHS-G-DSE-B-P	Digital electronics (Practical)	Construction of 4 × 1 Multiplexer using IC 74151.	Practical	SG

Sd/

Soumyadev Ghosh
Dept. of Physics





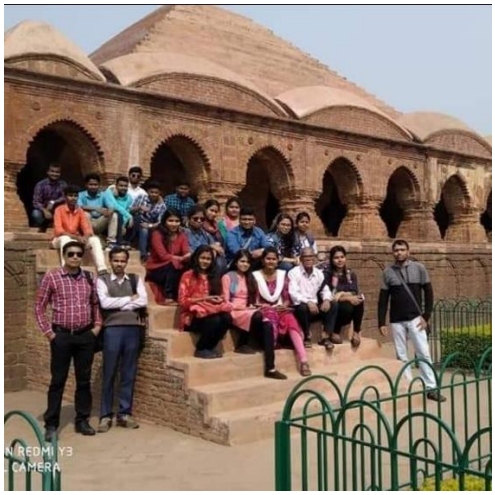
Student – Centric Method

Physics, Chemistry, Mathematics and Food & Nutrition Departments collaborated on a science-themed educational trip to Bishnupur, renowned for its historical sites, architecture, and silk weaving industry. The day trip, held on February 19th, 2020, involved student participation in several activities.

- **Meal Planning:** Students planned a travel-friendly breakfast menu for the entire group, calculating calorie, protein, and carbohydrate content.
- **Dietary Survey:** Throughout the day, students documented their meals (as a diet survey) to analyze daily calorie and nutrient intake.
- **Report Writing:** Based on the survey, students drafted reports proposing dietary modifications suitable for frequent travelers and working professionals.

  This excursion provided a valuable opportunity for teamwork, exploration, and cultural immersion. Students gained firsthand experience with Bishnupur's rich heritage and conducted a dietary survey of the local population. Additionally, the trip sparked curiosity about the science underlying the town's architectural marvels.

Beyond academics, the excursion fostered teamwork, historical exploration, and a unique opportunity to study the scientific principles behind Bishnupur's architecture.

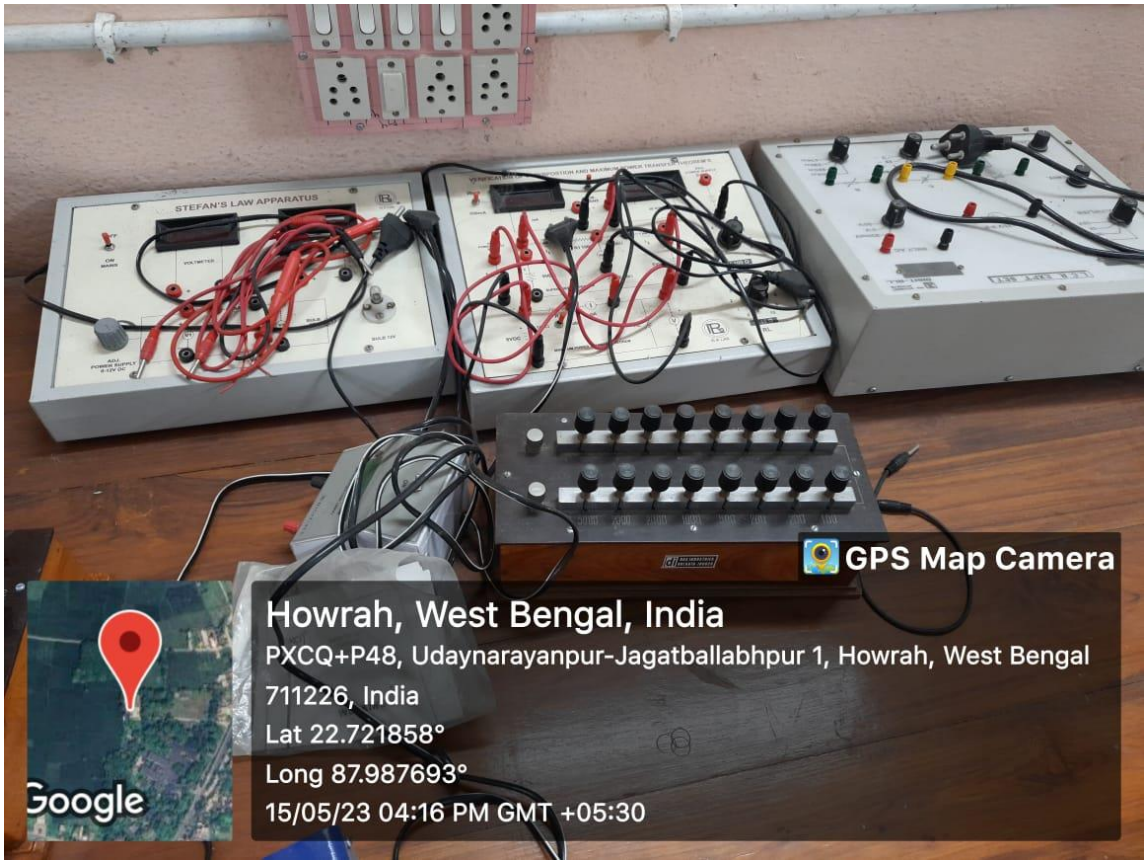


PROGRAMME OUTCOME (PO)

The undergraduate physics program fosters critical thinking in students through presentations, projects, and opportunities to develop original ideas across various physics topics. This curriculum cultivates a strong foundation in scientific thinking.

By examining scientific advancements throughout history and their reflection on social and environmental issues, the program equips students with a deeper understanding of topics like gender, sustainability, ethics, and the importance of preserving cultural heritage. This knowledge empowers them to become more informed and engaged citizens.

Furthermore, the program exposes students to the global landscape of science and technology, broadening their perspective on physics and opening doors to diverse research opportunities. By honing their ability to critically analyze scientific information, students graduate prepared for a wide range of careers that require this valuable skillset.



Course outcome

SEM-1, Theory	*Paper: PHS-G-CC-1-1-TH Mechanics*	*Vector Algebra, Ordinary Differential Equations, Motion, Rotational Motion, Central force and Gravitation, Oscillations, Elasticity, Surface Tension,*
SEM-1, practical	***PHS-G-CC-1-1-P***	*1. Determination of Moment of inertia of cylinder/bar about axis by measuring the time period, of the cradle and with body of known moment of Inertia* *2. Determination of Y modulus of a metal bar of rectangular cross section by the method of exure* *3. Determination of rigidity modulus of wire by measuring the time period of torsional oscillation of a metal cylinder attached to it.* *4. Determination of Moment of Inertia of a flywheel.* *5. Determination gravitational acceleration, g using bar pendulum .*
SEM-2, Theory	*PHS-G-CC-2-2-TH_ Electricity and Magnetism .*	*Essential Vector Analysis, Electrostatics. Magnetism,*
SEM-2, PRACTICAL	***PHS-G-CC-2-2-P***	*1..Determination of unknown resistance by Carey Foster method.* *2. Measurement of a current flowing through a register using potentiometer* *3. Determination of the horizontal components of earth's magnetic field.* *4. Conversion of an ammeter to a voltmeter.* *5. Conversion of a voltmeter to an Ammeter*
Sem-3 THEORY	*PHS-G-CC-3-3-TH*	*Laws of Thermodynamics, Thermo dynamical Potentials, Kinetic Theory of Gases, Theory of Radiation, Statistical Mechanics,*

Sem-3 , practical	***PHS-G-CC-3-3-P***	*1. Determination of the coefficient of thermal expansion of a metalic rod using an optical lever* *2. Verication of Stefan's law of radiation by the measurement of voltage and current of a torch bulb glowing it beyond draper point.* *3. To determine Thermal coefficient of Resistance using Carey forster bridge.* *4. To determine the Coefficient of Thermal Conductivity of a bad conductor by Lee and Charlton's disc method.* *5. Determination of the pressure coefficient of air using Jolly's apparatus.*
SEM-4, THEORY	***PHS-G-CC-4-4-TH***	*Accoustics, Superposition of vibrations, Vibrations in String, Introduction to wave Optics, Interference, Diffraction, Polarization*
SEM-4, PRACTICAL	*PHS-G-CC-4-4-P*	*1. Determination of the focal length of a concave lens by auxiliary lens method.* *2. Determination of the frequency of a tuning fork with the help of sonometer* *3. Determination of radius of curvature of plano convex lens/wavelength of a monochromatic or quasi monochromatic light using Newtons ring.* *4. Measurement of thickness of a paper from a wedge shaped film.* *5. Measurement of specific rotation of active solution (e.g., sugar solution) using polarimeter.*
SEM-5 THEORY	***PHS-G-DSE-A-TH – Analog Electronics***	*Circuits and Network, Semiconductor Devices, Regulated Power Supply, Field Effect transistors, . Feedback Amplifiers, Operational Ampliers, . Sinusoidal Oscillators*

SEM-5 PRACTICAL	*PHS-G-DSE-A-P*	*1. . Veryfication of Thevenin and Norton's theorem, super position theorem and maximum power transfer theorem for resistive network fed by D.C. power supply.* *2. Study the emitter characteristics of a photo transistor illuminated by LED.* *3. TO study the characteristics of a Transistor in CE conguration.* *4. Construction of a regulated power supply using LM 317 IC.* *5. To study OPAMP: inverting amplifer, non inverting amplier, adder, subtractor.*
SEM-6 THEORY	***PHS-G-DSE-B-TH– Digital Electronics***	*Integrated Circuits, Number System, Digital Circuits, . Data processing circuits, Sequential Circuits, : Registers and Counters*
SEM-6 PRACTICAL	*PHS-G-DSE-B-P*	*1. To verify and design AND, OR, NOT and XOR gates using NAND gates* *2. Construction of half adder, and full adder using NAND/NOR gate.* *3. Construction of SR, D FF circuits using NAND gates.* *4. Construction of 4 bit shift registers (serial & parallel) using D type FF IC 7476.* *5.*

One Day National Webinar on the Modern-day Application of Material Science & Nano Technology.

Organizer: - Department of Physics & Chemistry in association with IQAC of Udaynarayanpur Madhabilata Mahavidyalaya in Collaboration with Physics & Chemistry Department & IQAC of Rabindra Mahavidyalaya

You tube link: - https://youtu.be/RsEHn_VUabs (full program is available in this link)

Program schedule for 1day national webinar on “Modern Day Application of Material Science & Nano Technology” at 11.30am-1.30pm on 10/07/2021

Inauguration session

(1) Welcome address- Dr Arabinda Ghosh, principal, UMM (11.30-11.40am)

(2) Inauguration speech – Dr Uday Kumar Khan, associate professor and HOD Physics, RM (11.40-11.50am)

Technical session

(1) Introductory speech- Tanmay Bandhyopadhyay, IQAC coordinator, RM(11.50-11.55am)

(2) Introductory speech – Sreemoyee Banerjee, IQAC coordinator, UMM(11.55-12.00Noon)

Main Session

Lecture – 1(12.00-12.30pm)

Dr Swarup Kumar Neogi

Assistant Professor, Department of Physics, Adamas University, Kolkata

(Session chairperson, Dr Amit Maity, Department of Chemistry, UMM)

Lecture-1 Question-answer session (12.30-12.40)

Lecture – 2(12.40-1.20pm)

Dr Sachindranath Das

Assistant professor, Department of Instrumentation Science, Jadavpur University, Kolkata

(Session chairperson- Dr Safiul Alam Mollick, Assistant Professor of physics, RM)

Lecture-2 Question- Answer Session (1.20-1.28pm)

Valedictory Session

Vote of Thanks – Snehasree Saha, Assistant Professor of Food & Nutrition, Umm (1.28-1.30pm)

- **Participant can post their query at the chat-box**