Modules of Classes and Examinations, 2022-23

B.Sc. (General) in Physics

Semester-II

- Total 75 Marks
- **Hiralal Bhakat Colllege, Nalhati**
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- **Core Course CC2B** ELECTRICITY AND MAGNETISM
- 40 Marks for Semester-end-Examination[#] (will be organized by University)
- 20 Marks for practical (will be organized by College in general and Department in Particular)
- 10+5=15 Marks for Internal Assessment (will be organized by College in general and Department in Particular)
- 10 Marks for Class Test/ Assignment/ Seminar
- 5 Marks for Attendence

  Attendence: 50% & above but below 60% - 2 Marks
  Attendence: 60% & above but below 75% - 3 Marks
  Attendence: 75% & above but below 90% - 4 Marks
  Attendence: 90% & Above - 5 Marks

Internal Assessment	**Component 1 (C_1)**	**Component 2 (C_2)**
Weightage	5 Marks	1.Vector Analysis: Review of vector algebra (Scalar and Vector product), gradient, divergence, Curl and their significance, Vector Integration, Line, surface and volume integrals of Vector fields, Gaussdivergence theorem and Stoke's theorem of vectors (statement only). 2.Electrostatics: Electrostatic Field, electric flux, Gauss's theorem of electrostatics. Applications of Gauss Theorem-Electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charged sheet, charged conductor. Electric potential as line integral of electric field, potential due to a point charge, electric dipole, uniformly charged spherical shell and solid sphere. Calculation of electric field from potential. Capacitance of an isolated spherical conductor. Parallel plate, spherical and cylindrical condenser. Energy per unit volume in electrostatic field. Dielectric medium, Polarisation, Displacement vector. Gauss's theorem in dielectrics. Parallel plate capacitor completely filled with dielectric. 3.Magnetism: Magnetostatics: Biot-Savart's law & its
Number of Questions	5	
Date	22-08-2023	
Time	2PM-3PM	
Syllabus	1.Vector Analysis: Review of vector algebra (Scalar and Vector product), gradient, divergence, Curl and their significance, Vector Integration, Line, surface and volume integrals of Vector fields, Gaussdivergence theorem and Stoke's theorem of vectors (statement only). 2.Electrostatics: Electrostatic Field, electric flux, Gauss's theorem of electrostatics. Applications of Gauss Theorem-Electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charged sheet, charged conductor. Electric potential as line integral of electric field, potential due to a point charge, electric dipole, uniformly charged spherical shell and solid sphere. Calculation of electric field	

	from potential. Capacitance of an isolated spherical conductor. Parallel plate, spherical and cylindrical condenser. Energy per unit volume in electrostatic field. Dielectric medium, Polarisation, Displacement vector. Gauss's theorem in dielectrics. Parallel plate capacitor completely filled with dielectric.	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. 4. Electromagnetic Induction: 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. (6 Lectures) Maxwell`s equations and Electromagnetic wave propagation: Equation of continuity of current, Displacement current, Maxwell's equations, Poynting vector, energy density in electromagnetic field, electromagnetic wave propagation through vacuum and isotropic dielectricmedium, transverse nature of EM waves, polarization.

Name of Teacher(s)	Md Ashik	Md Ashik
Number of Classes	62 (Tentative)	125 (Tentative)

Component 2(C_3)

- 40Marks for Semester-end-Examination (will be organized by University)
- Answer 5 questions out of 8 carrying 02 marks each = 5 x 02 = 10 marks
- Answer 5 questions out of 7 carrying 03 marks each = 5 x 03 = 15 marks
- Answer 03 questions out of 05 carrying 5 marks each = 03x 5 = 15 marks

- Whole Syllabus of CC 2A

- Practical (Mechanics) = 20 Marks
  Laboratory Note Book: 05 Marks
  Viva- voce: 05 Marks
  Experiment: 40 Marks (This 40 marks will be transformed into 10 Marks)

- A project File (Laboratory Note Book), comprising one exercise each is to be submitted.

Modules of Classes and Examinations, 2022-23

B.Sc. (GENERAL) IN PHYSICS

Semester-IV

Hiralal Bhakat Colllege, Nalhati

Core Course 2D : WAVE AND OPTICS

- Total 75 Marks
- 40 Marks for Semester-end-Examination[#] (will be organized by University)
- 20 Marks for practical (will be organized by College in general and Department in Particular)
- 10+5=15 Marks for Internal Assessment (will be organized by College in general and Department in Particular)
- 10 Marks for Class Test/ Assignment/ Seminar
- 5 Marks for Attendence

  Attendence: 50% & above but below 60% - 2 Marks
  Attendence: 60% & above but below 75% - 3 Marks
  Attendence: 75% & above but below 90% - 4 Marks
  Attendence: 90% & Above - 5 Marks

Internal Assessment	**Component 1 (C_1)**	**Component 2 (C_2)**
Weightage	5 Marks	1. Superposition of Two Collinear Harmonic oscillations: Linearity and Superposition Principle. (1) Oscillations having equal frequencies and (2) Oscillations having different frequencies (Beats) 2. Superposition of Two Perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures with equal an unequal frequency and their uses. 3.Waves Motion-General: Transverse waves on a string. Travelling and standing waves on a string. Normal Modes of a string. Group velocity, Phase velocity. Plane waves.Spherical waves, Wave intensity. 4. Fluids: Surface Tension: Synclastic and anticlastic surface - Excess of pressure – Application to spherical and cylindrical drops and bubbles- variation of surface tension with temperature - Jaegar's method. Viscosity: Viscosity - Rate flow of liquid in a capillary tube - Poiseuille's formula - Determination of coefficient of viscosity of a liquid - Variations of viscosity of a liquid with temperature lubrication. Physics of low pressure - production and measurement of low pressure- Rotary pump- Diffusion pump - Molecular pump - Knudsen absolute gauge - penning and pirani gauge – Detection of leakage. Sound: Simple harmonic motion - forced vibrations and resonance - Fourier's Theorem - Application to saw tooth wave and square wave - Intensity and loudness of sound - Decibels - Intensity levels - musical notes - musical scale. Acoustics of buildings: Reverberation and time of reverberation - Absorption coefficient - Sabine's formula –
Number of Questions	5	
Date	19-05-2023	
Time	2PM-3PM	
Syllabus	1.Superposition of Two Collinear Harmonic oscillations: Linearity and Superposition Principle. (1) Oscillations having equal frequencies and (2) Oscillations having different frequencies (Beats) 2. Superposition of Two Perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures with equal an unequal frequency and their uses. 3.Waves Motion-General: Transverse waves on a string. Travelling and standing waves on a string. Normal Modes of a string. Group velocity, Phase velocity. Plane waves.Spherical waves, Wave intensity. 4. Fluids: Surface Tension: Synclastic and anticlastic surface - Excess of pressure – Application to spherical and	

	cylindrical drops and bubbles-variation of surface tension with temperature - Jaegar's method. Viscosity: Viscosity - Rate flow of liquid in a capillary tube - Poiseuille's formula - Determination of coefficient of viscosity of a liquid - Variations of viscosity of a liquid with temperature lubrication. Physics of low pressure - production and measurement of low pressure- Rotary pump- Diffusion pump - Molecular pump - Knudsen absolute gauge - penning and pirani gauge – Detection of leakage	measurement of reverberation time- Acoustic aspects of halls and auditoria. (6 Lectures) Wave Optics: Electromagnetic nature of light. Definition and Properties of wavefront. Huygens Principle. 5. Interference: Interference: Division of amplitude and division of wavefront. Young's Double Slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: measurement of wavelength and refractive index. 6. Michelson'sInterferometer: Idea of form of fringes (no theory needed), Determination of wavelength, Wavelength difference, Refractive index and Visibility offringes. 7. Diffraction: Fraunhofer diffraction: Single slit; Double Slit.Multiple slits & Diffraction grating. Fresnel Diffraction: Half-period zones. Zone plate. Fresnel Diffraction pattern of a straight edge, a slit and a wire using half-period zone analysis. (14Lectures) Polarization: Transverse nature of light waves. Plane polarized light – production and analysis. Circular and elliptical polarization.

Name of Teacher(s)	Md Ashik	Md Ashik
Number of Classes	62 (Tentative)	125 (Tentative)

Component 2:

- 40Marks for Semester-end-Examination (will be organized by University)
- Answer 5 questions out of 8 carrying 02 marks each = 5 x 02 = 10 marks
- Answer 5 questions out of 7 carrying 03 marks each = 5 x 03 = 15 marks
  Answer 03 questions out of 05 carrying 5 marks each = 03x 5 = 15 marks
- Whole Syllabus of CC 2C

- Practical (Statistical Methods in Geography) = 20 Marks
  Laboratory Note Book: 05 Marks
  Viva- voce: 05 Marks
  Experiment: 40 Marks (This 40 marks will be transformed into 10 Marks)

- A project File (Laboratory Note Book), comprising one exercise each is to be submitted.

Modules of Classes and Examinations, 2022-23

B.Sc. (General) in Physics

Semester-VI

Hiralal Bhakat Colllege, Nalhati

DSE 2B DIGITAL ELECTRONICS

- Total 75 Marks
- 40 Marks for Semester-end-Examination[#] (will be organized by University)
- 20 Marks for practical (will be organized by College in general and Department in Particular)
- 10+5=15 Marks for Internal Assessment (will be organized by College in general and Department in Particular)
- 10 Marks for Class Test/ Assignment/ Seminar
- 5 Marks for Attendence

  Attendence: 50% & above but below 60% - 2 Marks
  Attendence: 60% & above but below 75% - 3 Marks
  Attendence: 75% & above but below 90% - 4 Marks
  Attendence: 90% & Above - 5 Marks

Internal Assessment	**Component 1 (C_1)**	**Component 2 (C_2)**
Number of Questions	5	1.Digital Circuits: Difference between Analog and Digital Circuits. Binary Numbers. Decimal to Binary andBinary to Decimal Conversion, AND, Or and NOT Gates (Realization using Diodes and Transistor). NAND and NOR Gates as Universal Gates. XOR and XNOR Gates. 2. De Morgan's Theorems. Boolean Laws. Simplification of Logic Circuit using Boolean Algebra. Fundamental Products.Minterms and Maxterms.Conversion of a Truth Table into an Equivalent Logic Circuitby (1) Sum of Products Method and (2) Karnaugh Map. 3. Binary Addition. Binary Subtraction using 2's Complement Method).Half Adders and Full Adders and Subtractors, 4-bit binary Adder-Subtractor. UNIT-2: Semiconductor Devices and Amplifiers: Semiconductor Diodes: p and n type semiconductors.Barrier Formationin PN Junction Diode. Qualitative Idea of Current Flow Mechanism in Forward and Reverse Biased Diode.PN junction and its characteristics. Static and Dynamic Resistance. Principleand structure of (1) LEDs (2) Photodiode (3) Solar Cell. (5Lectures) Bipolar Junction transistors: n-p-n and p-n-p Transistors. Characteristics of CB, CE and CC Configurations. Active, Cutoff, and
Date	30-05-2023	
Time	1:30PM	
Syllabus Time	1. Planck's quantum, Planck's constant and light as a collection of photons; Photo-electric effect and Compton scattering. De Broglie wavelength and matter waves; Davisson – Germer experiment. (8Lectures) Problems with Rutherford model- instability of atoms and observation of discrete atomic spectra; Bohr's quantization rule and atomic stability; calculation of energy levels for hydrogen like atoms and their spectra. 2. Position measurement-gamma ray microscope thought experiment; Wave-particle duality, Heisenberg uncertainty principle- impossibility of a particle following a trajectory; Estimating minimum energy of a confined particle using uncertainty principle; Energy-	

	time uncertainty principle. 3. Two slit interference experiment with photons, atoms and particles;linear super position principle as a consequence; Matter waves and wave amplitude; Schrodinger equation for non- relativistic particles; Momentum and Energy operators; stationary states; physical interpretation of wavefunction, probabilities and normalization; Probability and probability current densities in one dimension.	Saturation Regions. Current gains α and β. Relations between α and β. Load Line analysis of Transistors. DC Load line and Q-point. Voltage Divider Bias Circuit for CE Amplifier. h-parameter Equivalent Circuit. Analysis of a single-stage CE amplifier using Hybrid Model. Input and Output Impedance. Current, Voltage and Power Gains. Class A, B, and C Amplifiers. UNIT-3: Operational Amplifiers (Black Box approach): Characteristics of an Ideal and Practical Op-Amp (IC 741), Open-loop & Closed-loop Gain.CMRR, concept of Virtual ground. Applications of Op-Amps: (1) Inverting and Non-inverting Amplifiers, (2) Adder, (3) Subtractor, (4) Differentiator, (5) Integrator, (6) Zero Crossing Detector. Sinusoidal Oscillators: Barkhausen's Criterion for Self-sustained Oscillations. Determination of Frequency of RC Oscillator (5Lectures) UNIT-4: Instrumentations: Introduction to CRO: Block Diagram of CRO. Applications of CRO: (1) Study of Waveform, (2) Measurement of Voltage, Current, Frequency, and Phase Difference. (3Lectures) Power Supply: Half-wave Rectifiers. Centre-tapped and Bridge Full-wave Rectifiers Calculation of Ripple Factor and Rectification Efficiency, Basic idea about capacitor filter, Zener Diode and Voltage Regulation Timer IC: IC 555 Pin diagram and its application as Astable & Monostable Multivibrator
Name of Teachers	Md Ashik Mondal	Md Ashik Mondal

Number of Classes	60 (Tentative)	120 (Tentative)

#Component 2:

- 40Marks for Semester-end-Examination (will be organized by University)
- Answer 5 questions out of 8 carrying 02 marks each = 5 x 02 = 10 marks
- Answer 5 questions out of 7 carrying 03 marks each = 5 x 03 = 15 marks
- Answer 03 questions out of 05 carrying 5 marks each = 03x 5 = 15 marks
- Whole Syllabus of DSE 2A

- Practical (: ELEMENTS OF MODERN PHYSICS) = 20 Marks
  Laboratory Note Book: 05 Marks
  Viva- voce: 05 Marks
  Experiment: 40 Marks (This 40 marks will be transformed into 10 Marks)

- A project File (Laboratory Note Book), comprising one exercise each is to be submitted.

Skill Enhancement Course – SEC 4

- Total 50 Marks
- 40 Marks(written exam) for Semester-end-Examination[#] (will be organized by University)
- 10 Marks for Class Test/ Assignment (will be organized by College in general and Department in Particular)

Internal Assessment	Component 1 (C_1)	Component 2 (C_2)
Weightage	5 Marks	1. Scientific Programming: Some fundamental Linux Commands (Internal and External commands). Development of FORTRAN, Basic elements of FORTRAN:CharacterSet, Constants and their types, Variables and their types, Keywords, Variable Declaration and concept of instruction and program. 2. Operators: Arithmetic, Relational, Logical and Assignment Operators. Expressions: Arithmetic, Relational, Logical, Character and Assignment Expressions. Fortran Statements: I/O Statements (unformatted/formatted), Executable and Non-Executable Statements, Layout of Fortran Program, Format of writing Program and concept of coding, Initialization and Replacement Logic. Examples from physics problems. 3. Control Statements: Types of Logic (Sequential, Selection, Repetition), Branching Statements (Logical IF, Arithmetic IF, Block IF, Nested Block IF, SELECT CASE and ELSE IF Ladder statements), Looping Statements (DO-CONTINUE, DO-ENDDO, DO-WHILE, Implied and Nested DO Loops), Jumping Statements (Unconditional GOTO, Computed GOTO, Assigned GOTO) Subscripted Variables (Arrays: Types of Arrays, DIMENSION Statement, Reading and Writing Arrays), Functions and Subroutines (Arithmetic Statement Function, Function Subprogram and Subroutine), RETURN, CALL, COMMON and EQUIVALENCE Statements), Structure, Disk I/O Statements, openafile, writing in a file, reading from a file. Examples from physics problems
Number of Questions	5	
Date	30-05-2023	
Time	1:30PM	
Syllabus	1. Introduction: Importance of computers in Physics, paradigm for solving physics problems for solution. Usage of linux as an Editor. 2. Algorithms and Flowcharts: Algorithm: Definition, properties and development. Flowchart: Concept of flowchart, symbols, guidelines, types. Examples: Cartesian to Spherical Polar Coordinates, Roots of Quadratic Equation, Sum of two matrices, Sum and Product of a finite series, calculation of sin (x) as a series, algorithm for plotting (1) lissajous figures and (2) trajectory of a projectile thrown at an angle with the horizontal	

Name of Teacher(s)	Md Ashik Mondal	Md Ashik Mondal
Number of Classes	60 (Tentative)	120 (Tentative)

#Component 2:

- 40Marks for Semester-end-Examination (will be organized by University)
- Answer 5 questions out of 8 carrying 02 marks each = 5 x 02 = 10 marks
- Answer 5 questions out of 7 carrying 03 marks each = 5 x 03 = 15 marks
- Answer 03 questions out of 05 carrying 5 marks each = 03x 5 = 15 marks
- Internal assessment 10

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