GOVERNMENT GENERAL DEGREE COLLEGE, RANIBANDH

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Program Outcome of Physics Major

(under NEP curriculum of the Bankura University)

The NEP 2020 strongly emphasizes outcome-based education, prioritizing clear learning outcomes for each course. For the FYUGP in Physics, the policy outlines specific program learning outcomes, including:

PO1. Knowledge and Comprehension: Students will gain a solid understanding of core physics principles such as classical mechanics, electromagnetism, thermodynamics, quantum mechanics, and statistical mechanics.

PO2. Analytical and Problem-Solving Skills: Students will learn to apply their physics knowledge to analyze and solve problems using mathematical tools, experimental techniques, and computational methods.

PO3. Research and Inquiry Skills: Students will develop the ability to engage in research by designing and conducting experiments, analyzing data, and effectively communicating their findings.

PO4. Communication and Presentation Skills: Students will be able to articulate their ideas and findings clearly through both written and oral presentations, using appropriate scientific language and tools.

PO5. Ethics and Values: Students will understand their work's ethical and social implications and demonstrate a commitment to conducting research and practice responsibly.

PO6. Interdisciplinary and Multidisciplinary Learning: Students will be equipped to integrate their physics knowledge with other disciplines and participate in multidisciplinary research and innovation.

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Link for the syllabus of Physics honours course

https://www.bankurauniv.ac.in/uploads/tempimagepdflink/1724646690.pdf

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Course Outcome of Physics Major

(under NEP curriculum of the Bankura University)

Core Courses	Course Outcomes
Mechanics and General Properties of Matter (Course Code: S/PHS/101/MJC-1)	1. Develop the concepts of classical mechanics, vector, vector differentiation and integration. 2. Acquire knowledge about the elasticity of the material and the streamline and turbulent motion. Understand the relationship between elastic constants. 3. Understand how major concepts developed and changed over time. 4. Capable of analyzing and solving problems using oral and written reasoning skills based on the concepts of classical mechanics. 5. Ability to prepare and organize a presentation on the application of fundamental dynamics 6. Students will learn to use the screw gauge, slide callipers, microscope, telescope. 7. They will know how to experimentally measure the Young's modulus, coefficient of viscosity of liquid, acceleration due to gravity, spring constant.
Basics of Computer and Python Programming (Course Code: S/PHS/104/SEC-1)	1. There is a scope to know the computer architecture. 2. There is a scope to study the Python programming language. 3. The students will be able to learn how can solve any physical problem in Python. 4. There is a scope to learn the graph plotting.
Electricity and Magnetism (S/PHS/201/MJC-2)	The course will help the students to understand the basic concepts of electrostatics including electric field, potential, electrostatic energy, electric dipole etc. They should be able to understand Laplace's equation, Poisson's equation, method of images and their application to simple electrostatic problems. The students will also acquire knowledge about dielectric

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	properties of matter and application of laws of electrostatics for dielectric materials. This course will provide the students with basic knowledge of magnetostatics i.e. magnetic effect of current and related laws of physics. On completion of the course students will learn about electromagnetic induction, magnetic properties of matter, operation of different ac electrical circuits, network theorem, etc. On performing the laboratory experiments students should have a rudimentary grasp on how experimental equipment related to electricity and magnetism can be used. They will have a better insight by experimentally verifying some of the laws/theorems of electricity and magnetism.
Basic Instrumentation Skills (Course Code: S/PHS/204/SEC-2)	Through this course, the students will develop the ideas about the basics of measurements. They learn the uses of various instruments like electronic voltmeter, cathode ray oscilloscope (CRO), Signal Generators and Analysis Instruments, Impedance Bridges & Q-Meters and some digital instruments.
Mathematical Physics-I (Course Code: S/PHS/301/MJC-3)	1.Students will develop the concepts of First Order and Second Order Differential equations. 2.Acquire knowledge on Particular Integral, Partial derivatives, and Integrating factor. 3.Learn about vector integration and related theorems like Divergence and Green theorem etc. 4.Acquire Knowledge about the orthogonal curvilinear coordinate systems and their transformation relation with special emphasis on spherical polar system. 5.Able to think about the mathematical formulation of Fourier series, half range series, Fourier transformation etc. 6.Get knowledge about ODE learn to solve series solution of 2nd order ODE, Bessel's

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	differential equation, Legendre's differential equation, Partial differential equations, 7.Solution of Laplace's equation in different coordinate systems by the method of separation of variables. 8. Understand and visualize different coordinate systems. 9. Implement basic vector operations in Python. 10. Solve first- and second-order differential equations using Python. 11. Implement numerical solutions for ordinary and partial differential equations. 12. Compute Fourier series for different functions. 13. Understand and visualize the impact of harmonics in periodic functions. 14. Explore special functions like Legendre and Bessel functions using Python.
Waves and Oscillation (Course Code: S/PHS/302/MJC-4)	The course will provide the students with knowledge of various aspects of simple harmonic oscillation including damped and forced oscillations, resonance, superposition under different conditions, Lissajous figures etc. The students will acquire knowledge about wave motion, superposition of waves and formation of waves on strings and pipes. Students also recognize and use a mathematical oscillator equation and wave equation, and derive these equations for certain systems, point out the limitations, and be able to refer to very different solutions of identical oscillator equations due to different initial and boundary conditions. This course will help the students to know how to determine the acceleration due to gravity at a place using Compound pendulum and Simple pendulum. Notice the difference between flat resonance and sharp resonance in case of volume resonator and sonometer experiments respectively. Verify the laws of transverse vibrations in a stretched string using sonometer

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	and comment on the relation between frequency, length and tension of a stretched string under vibration. Demonstrate the formation of stationary waves on a string in Melde's string experiment. Observe the motion of coupled oscillators and normal modes. Examine phenomena of simple harmonic motion and the distinction between undamped, damped and forced oscillations and the concepts of resonance and quality factor with reference to damped harmonic oscillator.
Introduction to LASER and Fibre Optics (Course Code: S/PHS/305/SEC-3)	On completion of this course a student should be able to demonstrate understanding of and be able to solve problems on: 1) absorption and spontaneous and stimulated emission in two level, three level, four level systems, and the conditions for laser amplification. 2) the four-level laser system, the simple homogeneous laser and its output behavior and optimal operating conditions. 3) spectral properties of a single longitudinal mode, mode locked laser operation, schemes for active and passive mode locking in real laser system. 4) operations and basic properties of the most common laser types- He-Ne, ruby.
Mathematical Physics II (Course Code: S/PHS/401/MJC-5)	1. Students will develop the concept about Argand diagram and know the algebraic operation on complex number 2. Know about different types of singularity and able to know simplest way of integration over a closed contour. 3. Able to solve simultaneous equations using matrix method and learn the properties of matrix. 4. Develop the idea about probability, probability distribution and central limit theorem. 5. Gain knowledge about Dirac-delta function and Kronecker delta functions.

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	6. Students will be familiar with Scilab language and be able to install and/or use the programming language. 7. They will be able to write the program to determine the roots of complex number and unity. 8. Students will gain sufficient knowledge to plot 2D/3D graph and able to plot data and functions. 9. Students will be able to solve differential equations and can determine the value of a definite integral. 10. They gain knowledge about least square fitting and may be apply this concepts to plot best graph in their laboratory work.
Heat and Thermodynamics (Course Code: S/PHS/402/MJC-6)	1. Know about the kinetic of gases, the zeroth law of thermodynamics, 1st and 2nd law of thermodynamics. 2. Gather knowledge about isothermal and adiabatic processes and learn how to solve thermodynamic problems. 3. Able to understand the working principle of Heat engines – Carnot's engine and its applications. 4. Learn about entropy and how the entropy of the universe is changing. 5. Understand the interrelationship between thermodynamic functions and the ability to use such relationships to solve practical problems. 6. Understand how statistics of the microscopic world can be used to explain the thermal features of the macroscopic world. 7. Be able to use thermal and statistical principles in a wide range of applications. 8. Able to learn how to experimentally measure the thermal conductivity in different methods. 9. Also learn about the platinum resistance thermometer, thermocouple, etc.
Classical mechanics (Course Code: S/PHS/403/MJC-7)	Upon successful completion of this course it is intended that a student will be able to:

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	1.Know how to impose constraints on a system in order to simplify the methods in solving physics problems. They will also understand the important of concepts such as generalized coordinates and constrained motion. 2.Learn about Lagrangian and Hamiltonian formulation of classical mechanics and get familiar with their applications to solve simple physics problems. 3. Distinguish between inertial and non-inertial frames. 4. They will also get acquainted to the various aspects of Theory and application in the field of special theory of relativity 5. Determine moment of inertia and elastic constants of different materials. 6. Estimate the value of acceleration due to gravity and get familiar with the digital timing technique.
Analog systems and Applications (Course Code: S/PHS/404/MJC-8)	1. This course will help the students to get familiar with different topics of semiconductor physics. 2. Acquire knowledge about three terminal devices, voltage-controlled devices and current controlled devices. 3. They will able to know about different amplifier circuits. Gain Understand how major concepts developed and changed over time. 4. The students will come to know about the operational amplifier and its uses in different aspects 5. Overall, they will gain sufficient knowledge on the theories of electronic circuits. 6. This course will help the students to get familiar electronic circuits, uses of bread board and discreate components. 7. Students will learn experimentally the I-V characteristics of PN diode, LED and BJT. 8. They will be able to design an amplifier using transistor.

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	9. They will be able to investigate the uses of Op. Amp. as inverting, non-inverting, adder and subtractor. 10. The students will be able to design Wien bridge oscillator, integrator, and differentiator by employing Op. Amp.