|| विद्या विनयेन शोभते ||

Janardan Bhagat Shikshan Prasarak Sanstha's

CHANGU KANA THAKUR

ARTS, COMMERCE AND SCIENCE COLLEGE, NEW PANVEL (AUTONOMOUS)

Re-accredited 'A+' Grade by NAAC (3rd Cycle - CGPA 3.61)
'College with Potential for Excellence' Status Awarded by UGC
'Best College Award' by University of Mumbai

Department of Physics 2024-25

Course Outcomes
Class: F.Y.B. Sc. Physics
Semester I

Course (Paper) Name and No.: Mechanics ,Properties of Matter & Basic Electronics (Theory)

Course Code : USC1PH1

CO-1   Derive theorem related to fluids ,solid, different circuits

CO-2   Implement logic gates, universal building blocks, and adders in digital electronics

CO-3   Calculate Friction coefficient, ripple factor,Elasticity , coefficient of viscosity,...

Course (Paper) Name and No.: Practicals of USC1PH1

Course Code : USC1PHP1

CO-1   Calculate physical constants of liquid and solid

CO-2   Design circuits to verify the circuits law

CO-3   Anticipate the basic skills of handling calculator & measuring instruments

Course (Paper) Name and No.: Basic Mechanics & Electronics (SEC)

Course Code : USEC1BME

CO-1   Anticipate the technical skills of handling basic measuring instruments

CO-2   Determine the physical constant of solid, liquid

CO-3   Design the circuits to verify the laws of circuits

Course (Paper) Name and No.: Digital Technology I (VEC)

Course Code : UVEC1DT1

CO-1 Discuss about the digital paradigm and applications of machine learning and big data

CO-2 Analyze the concepts of communication and networks.

CO-3 Anticipate the importance of digital technology, digital financial tools, e- commerce, e-governance and Digital India initiatives, use & applications of digital technology.

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Class: F.Y.B. Sc. Physics
Semester II

Course (Paper) Name and No.: Optics & Modern Physics

Course Code : USC2PH2

CO-1 Discuss natural physical processes related to light waves, lens system, aberration

CO-2 Apply the principles and applications of various optical instruments

CO-3 Explain the origins and key concepts of quantum mechanics

Course (Paper) Name and No.: Practicals of USC2PH2

Course Code : USC2PHP2

CO-1 Anticipate the technical skill of handling basic instruments

CO-2 Measure the physical constant of prism and lens

CO-3 Design digital circuits to verify its law.

Course (Paper) Name and No.: Basics of Optics & Electronics

Course Code : USEC2BOE

CO-1 Anticipate the technical skills of handling basic measuring instruments

CO-2 Verify light law using grating, laser sources

CO-3 Design the circuits to verify the laws of circuits

Course (Paper) Name and No.: Digital Technology II

Course Code : UVEC2DT2

CO-1 Discuss the principles, models, and transmission media of communication systems, future
trends and implications of digital technologies on various sectors.

CO-2 Analyze the need for digital inclusion and empowerment, along with the associated
challenges.

CO-3 Evaluate government-to-citizen (G2C) services, including online portals and mobile
applications for accessing government services.

CO-4 Examine blockchain technology and its implications for security initiatives by the
Government of India..

Course (Paper) Name and No.:Mathematical Physics ,Analog Electronics, Classical Mechnics (T)

Course Code : USC3PH1

CO1 Solve numerical problems based on laws of conservation of momentum & energy, compound pendulum, damped harmonic oscillator, forced harmonic oscillator, Vector integrals, transistors, General amplifier.

CO2 Determine the operating point, stability factor for different transistor biasing methods, conditions for forced & damped harmonic oscillator, time period of compound pendulum, Momentum for particles

CO3 Discuss basic of Semiconductor and its Application, Transistors, Oscillators, Opamp, Gradient, Curl, Divergence terms & its applications, laws of conservation of momentum & energy, compound pendulum, damped & forced harmonic oscillator

Course (Paper) Name and No.:Optics (Theory)

Course Code :USC3PH

CO1 Explain the factors affecting Acoustics of buildings, Principle of operation of LASER and Propagation of light through Optical Fiber, variation of Physical and Chemical properties in the interior of the Earth, Continental drift, Plate tectonics, Types of plates and Cause of Earthquake

CO2 Interpret the concept of relativistic simultaneity, how events that are simultaneous in one frame of reference may not be simultaneous in another frame.

CO3 Discuss the concept of mass-energy equivalence as introduced by the Special Theory of Relativity, including the famous equation $E=mc^2$

CO4 Compare the materials on the basis of Electrical conductivity and relative magnetic permeability.

Course (Paper) Name and No.: Practicals of USC3PH1 and USC3PH2

Course Code: USC3PHP

CO1 Experiment with CE amplifier, compound Pendulum

CO2 Inspect frequency response, voltage gain, acceleration of gravity.

CO3 Construct electronic circuits using resistor, capacitor, diode, transistor.

CO4 Estimate physical constants related to matter by different methods

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Plot No.-1, Sector-11, Khanda Colony, New Panvel (W), Dist.-Raigad, Maharashtra, India - 410 206. ☎ :(022)2745 5760, 2746 4193,
Super Fax : 9022933585 • E-mail : principalckthakurcollege@rediffmail.com / principal@ckthakurcollege.net • URL : www.ckthakurcollege.net

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Course (Paper) Name and No.: Properties of Matter

Course Code: USC3PMM

CO1 Measure different mechanical properties of Solids like the Moment of Inertia, Modulus of Elasticity

CO2 Apply laws of elasticity, moment of inertia concepts in various physical situations

CO3 Describe the fundamental concepts of electrical conductivity, resistivity, and dielectric properties of materials

CO4 Classify materials based on their magnetic properties and explain the role of crystal structure and chemical composition in these properties

Course (Paper) Name and No.:Basic Techniques for synthesis of materials

Course Code: UVSC3BTSM

CO1 Anticipate the fundamental concepts of solution preparation, including molarity, molality, molar mass, molecular weight, solute, solvent, and solution.

CO2 Apply mathematical calculations for preparing molar solutions and composites accurately.

CO3 Demonstrate proficiency in using laboratory solution preparation devices like weighing balances and magnetic stirrers, understanding their principles, advantages, and limitations

CO4 Familiarize yourself with various synthesis methods such as microwave synthesis, co-precipitation, hydrothermal, ultrasonication, and silar techniques, understanding their principles and applications in practical experiments.

CO5 Develop hands-on skills in preparing solutions, synthesizing materials, and conducting experiments using appropriate laboratory techniques and equipment.

CO6 Analyze experimental data, interpret results, and draw conclusions based on the principles of solution chemistry and synthesis methods.

Course (Paper) Name and No.:Quantum mechanics, Thermodynamics, Electronics (Theory)

Course Code: USC4PH1

CO1 Explain postulates of quantum mechanics, operators, expectation values in quantum mechanics and Schrodinger's equation, thermodynamics law

CO2 Design basic circuits using Op-amp , transistor , oscillator

CO3 Apply the OPAMP, Oscillators circuits for various applications like Inverting, Noninverting, Integrator, Differentiator, Wein bridge oscillator to find voltage gain and critical frequency

CO4 Solve numerical sums related to Quantum Mechanics, Thermodynamics, OPAMP and oscillators

Course (Paper) Name and No.: Digital Electronics And 8085 Microprocessor (Theory)

Course Code: USC4PH2

CO1 Determine physical constants of solids, the Resolving power of telescope & grating, wavelength of the monochromatic light, refractive index.

CO2 Design & construct MS-JK flip flop (IC 7476), Latch (IC 7400/IC 7402) , 8:3 Priority Encoder (IC 74LS148) and 3:8 Decoder (IC 74LS138), shift register, oscillator, Half adder and full adder using EX-OR gate, Op-amp as a Differentiator and Integrator.

CO3 Develop a programme using 8085 microprocessor.

CO4 Experiment with IC-7486, IC-7408, IC-7476, IC-7400, IC-7402, IC-74148, IC-74138, IC-74194, IC-741, spectrometer, telescope

Course (Paper) Name and No.: Practicals of USC4PH1 and USC4PH2

Course Code : USC4PHP

CO1 Perform measurements of the voltage gain using OPAMP, physical constants related to heat.

CO2 Construct circuits using ICs for OPAMP, Encoder, decoder, Flips flop applications

CO3 Verify the truth table of ICS with its application.

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Course (Paper) Name and No.:Optics and electronics

Course Code: USC4OEM

CO1 To explain the principles and applications of light, lenses, spectrometry, and combinational logic circuits.

CO2 To explore the fundamental concepts and practical applications of optics and combinational logic circuits.

Course (Paper) Name and No.:Electronic devices and circuits

Course Code: USEC4EDC

CO1 Anticipate fundamental Concepts of power supply circuits, function of transformers and electronic components such as resistors, switches, relays, and fuses in circuits

CO2 Designing Electronic Circuits such as P-N junction diodes , transistor, clipping circuits etc.

CO3 Develop Practical Skills and Application of Assembling solar study lamp, a personal computer etc.

CO4 Familiarize with various types of Integrated Circuits (ICs), their pin configurations, and testing procedures, and utilize IC manuals for reference and troubleshooting.

CO5 Hands-on Experience of transistors, amplifiers,oscillators, IC and flip-flops.

Course (Paper) Name and No.: Mathematical, Thermal and Statistical Physics

Course Code: USC5PH1

CO1 Develop proficiency in using mathematical techniques such as differential equations, linear algebra, and complex analysis to solve physical problems.

CO2 Explain Fermi-Dirac and Bose-Einstein statistics and their application to systems of indistinguishable particles.

CO3 Apply statistical mechanics to explain the behavior of real gases, blackbody radiation, and specific heat capacities of solids.

Course (Paper) Name and No.: Solid State Physics

Course Code: USC5PH2

CO1 Explain the basics of crystallography, Electrical properties of metals, Band Theory of solids, demarcation among the types of materials, Semiconductor Physics and Superconductivity.

CO2 Apply the basic concepts of Fermi probability distribution function, Density of states, conduction in semiconductors and BCS theory of superconductivity.

CO3 Demonstrate quantitative problem-solving skills in all the topics covered.

Course (Paper) Name and No.:Atomic and Molecular Physics

Course Code: USC5PH3

CO1 Explain application of quantum mechanics in atomic physics, the importance of electron spin, symmetric and antisymmetric wave functions and vector atom model, Effect of magnetic field on atoms and its application and an insight into spectroscopy.

CO2 Apply principles of quantum mechanics to describe atomic orbitals, probability densities, and electron transitions.

CO3 Interpret rotational and vibrational spectra and understand the concept of selection rules in molecular transitions.

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Course (Paper) Name and No.:Electrodynamics

Course Code: USC5PH4

CO1 Analyze the behavior of dielectrics in electric fields, including concepts of polarization, dielectric constant, and susceptibility.

CO2 Apply Ampère's law to determine magnetic fields in systems with high symmetry and solve problems involving magnetic materials.

CO3 Develop quantitative problem solving skills

Course (Paper) Name and No.:ANALOG CIRCUITS, INSTRUMENTS AND CONSUMER APPLIANCES.

Course Code: USC5PH5

CO1 Identify and classify different types of chemical sensors based on their detection mechanisms, such as electrochemical sensors, optical sensors, and gas sensors.

CO2 Explore advanced features of modern CROs, including digital storage, waveform capture, FFT (Fast Fourier Transform) analysis, and automated measurements.

CO3 Apply signal conditioning techniques such as amplification, filtering, and isolation to prepare signals for digitization.

CO4 Apply data acquisition systems in various fields such as scientific research, industrial automation, environmental monitoring, and medical diagnostics.

CO5 Develop diagnostic devices and instruments for medical diagnosis, disease screening, and treatment planning

Course (Paper) Name and No.: Basics of Electricity for wiring. (CC)

Course Code: USC5BE

CO1 Learn and acquire hands-on experience in the usage of multimeters, soldering iron, oscilloscopes, power supplies.

CO2 Design and trouble shoots the basic electrical circuits through hands-on mode

CO3 Identify the basic components used for Electronic & Electrical experiments

Course (Paper) Name and No.: Classical Mechanics

Code: USC6PH1

CO1 Analyze simple nonlinear systems and understand the conditions leading to chaotic behavior.

CO2 Develop proficiency in using analytical techniques and mathematical tools to solve complex problems in classical mechanics.

CO3 Apply Newton's laws to solve problems involving forces, motion, and energy in single and multi-particle systems.

Course (Paper) Name and No.: Electronics

Course Code: USC6PH2

CO1 Analyze the operation and characteristics of basic semiconductor devices such as diodes, transistors (BJT and FET), and their applications in circuits.

CO2 Design analog electronic circuits for various applications, such as signal amplification and filtering.

CO3 Explain the fundamentals of digital electronics, including logic gates, Boolean algebra, and combinational and sequential circuits.

Course (Paper) Name and No.: Nuclear and Particle Physics

Course Code: USC6PH3

CO1 Apply knowledge of decay processes to solve problems related to half-life, decay constant, and activity of radioactive materials.   .

CO2 Explain the principles and operation of nuclear reactors and the process of nuclear energy generation.

CO3 Comprehend different nuclear models, such as the liquid drop model, shell model, and collective model, and their applications in explaining nuclear structure and stability.

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Course (Paper) Name and No.:Special Theory of Relativity

Course Code: USC6PH4

CO1 Explain the significance of Michelson Morley experiment and failure of the existing theories to explain the null result

CO2 Derive and apply Lorentz transformations to describe the relationship between coordinates in different inertial frames of reference.

CO3 Analyze relativistic collisions and apply conservation laws in relativistic scenarios.

CO4 Solve problems based on length contraction, time dilation, velocity addition, Doppler effect, mass energy relation and resolve paradoxes in relativity like twin paradox etc.

Course (Paper) Name and No.:DIGITAL ELECTRONICS, MICROPROCESSOR, MICROCONTROLLER AND OOP

Coure Code: USC6PH5

CO1 Apply Boolean algebra to simplify and design combinational logic circuits.

CO2 Interface various sensors and actuators with Arduino boards for data collection and control.

CO3 Apply Python for system administration, web scraping, and other automation tasks.

CO4 Utilize the Standard Template Library (STL) for data structures, algorithms, and iterators in C++.

CO5 Develop programs using classes, objects, inheritance, polymorphism, and encapsulation.

Course (Paper) Name and No.:Solar Energy- Fundamentals & Its Applications-I (CC)

Course Code: USC6SE

CO1 Learn and acquire hands-on experience in handling Solar / PV cells.

CO2 Learn and acquire knowledge of solar energy and its relevance.

CO3 Design and trouble shoots the basic electrical circuits through hands-on mode

CO4 Design basic solar systems.

CO5 Familiarize to determine the effect of several variables on the output

CO6 Identify the basic components used for Solar systems

CO7 Explores energy from the sun in terms of radiant energy to expand on the concept of electricity generation.

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