Maharaja Surajmal Brij University

Bharatpur (Rajasthan)

Syllabus

Multidisciplinary Course

Subject: Physics

Semester-III,IV,V&VI

Session (2024-25)

अरूण कुमार पाण्डेय
उपकुलसचिव
भारी अकादमिक प्रथम

Syllabus
MDC-PHY
20T-1001
III - Semester

Semester	Code of the Course	Title of the Course/Paper				NHEQF Level	Credits
III	MDC-PHY 20T-1001	BASIC PHYSICS-II				5	4
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method	
		Theory	Practical	Total			
	MDC	4	-	4	Yes	Lecture	
List of programme Codes in which Offered as Minor Discipline	None						
Prerequisites	Basic Physics – I Semester or II Semester						
Objectives of the Course:	The objective of this course is to provide students with a comprehensive understanding of key principles in physics, encompassing the mechanical properties of matter, thermodynamics, ray optics and electricity. Through this course, students will develop the ability to apply fundamental laws and theories to solve real- world problems, enhancing their critical thinking and analytical skills. The course aims to develop a deep comprehension of physical phenomena and their practical applications in technology and industry.						

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Detailed Syllabus

MDC-PHY-20T -1001 –BasicPhysics-II

Unit-I

Mechanical Propertiesof Matter: Elasticity, Elastic Limit, Stress, Strain, Hooke's Law and Modulus of Elasticity, Poisson's Ratio, PracticalApplication of Elasticity, ConceptofSurfaceTension,DefinitionofSurfaceTension,SurfaceEnergy,Cohesive and Adhesive Forces. Flow of Liquids, Streamline and Turbulent Flow, Viscosity, Critical Velocity and Reynold's Number, Newton's Formula, and Coefficient of Viscosity.

(15Lectures)

Unit-II

Thermodynamics: Concept of Heat and Temperature, zeroth law of thermodynamics, Scale of Temperature, Thermal Expansion, Heat and Mechanical Work,IndicatorDiagram,firstlawofthermodynamics,Workdoneduringisothermal and adiabatic processes, Reversible and Irreversible Process, Heat engine: Carnot's cycle, Carnot's Ideal heat engine and Efficiency (No Derivation).

(15Lectures)

Unit–III

Ray Optics: Reflection of Light, Law of Reflection, Formation of image in a plane Mirror, Spherical Mirror,Terms andTheirDefinitions Related to Spherical Mirrors, Sign Convention, Relation between Focal Length and Radius of Curvature, Formation of Image in Spherical Mirror and Nature of Images, Mirror Formula, Linear Magnification, Nature and Position of Image for Various Positions of the object in Spherical Mirrors, Use of Spherical Mirrors.

(15Lectures)

Unit-IV

Electricity: Electric Current, Charge carriers in different materials, Ohm's law, resistivity and conductivity, Resistors, types of resistors, Classification of materials basedonresistivity,temperaturedependenceofresistivity,Capacitanceand

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Inductance. Impedance, Reactance, Conductance, Cell and Battery, The electromotiveforceofacell,theinternalresistanceofacell,Measurementofelectric current, electric energy, electric power, and electric fuse. Choke Coil, Transformer (only Introduction).

(15Lectures)

SuggestedBooksandReferences–

1. ConceptofPhysics Vol.I& Vol.IIbyH.C.Verma(HCV),BhartiBhawan Publishers.
2. FundamentalofPhysicsbyHalliday,ResnickandWalker,JohnWiely&Sons.
3. MechanicsbyD.S.Mathur,P.S.Hemne,S.ChandandCompanyLimited.
4. HeatThermodynamicsandStatisticalPhysicsbyBrijLal,Subrahmanyamand Hemne, S. Chand and Company Limited.

CourseLearningOutcomes:

Bytheendofthiscourse,studentswillbeableto:

1. UnderstandandApplyMechanicalPropertiesofMatter
2. ComprehendFundamentalPrinciplesofThermodynamics.
3. AnalyzeRayOpticsandImageFormation
4. UnderstandElectricalConceptsandTheirApplications

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Syllabus

MDC-PHY
20T -2001

IV -Semester

Semester	Codeofthe Course	TitleoftheCourse/Paper				NHEQF Level	Credits
IV	MDC-PHY 20T -2001	BASICPHYSICS–III				5	4
Levelof Course	Typeofthe Course	CreditDistribution			Offered to NC Student	CourseDelivery Method	
		Theory	Practical	Total			
	MDC	4	-	4	Yes	Lecture	
List of Programme Codes in which Offered as Minor Discipline		None					
Prerequisites		BasicPhysics–IIinIII SemesterorIVSemester					
Objectivesofthe Course:		The primary objective of this course is to provide a comprehensive understanding of the fundamental principles and concepts in classical and modern physics, particularly focusing on electric charge, magnetism, semiconductors, radioactivity, nuclear structure,andquantummechanics.Bydelvingintothesecoreareas, studentswillgainarobustfoundationnecessaryforadvancedstudies and applications in physics and related fields.					

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Detailed Syllabus

MDC-PHY-20T-2001 –BasicPhysics-III

Unit-I

Electriccharge: Propertiesofcharge,comparisonofchargeandmass,conservation of charge, Quantization of charge, Coulomb's law, Force on a point charge due to multiplecharges.ConceptofElectricFieldanditsPhysicalImportance,Electricfield intensity, Dielectric Medium and Dielectric Constant, Electric dipole and dipole moment. Magnetism: Natural Magnets, Artificial Magnets, Properties of a Bar Magnet, Magnetic Lines of force, Coulomb's Law, Intensity of Magnetic Field.

(15Lectures)

Unit–II

Semi-Conductors: Distinctionbetweenmetals,insulatorsandsemiconductors.Pand N-type Semiconductors, Electrons and Holes in an Intrinsic Semiconductor, Semiconductor-diode and its Characteristics, Static and Dynamic Resistance. DC power supply: Half wave rectifier, Full wave rectifier.

Bipolar Junction Transistor: Review of the characteristics of transistor in CE and CBconfigurations,Regionsofoperation(active,cutoffandsaturation),Currentgains α and β. Relations between α and β. dc load line and Q point.

(15Lectures)

Unit–III

Radioactivity: Nature of Radioactive Radiations, Theory of Radioactive Decay, Half-Life,UnitsofRadioactivity,RadioactiveSeries,DiscoveryofNeutron,Massof Neutron, Fast and Thermal Neutrons, Properties of Neutrons.

NuclearStructure: NuclearComposition,SomeNuclearProperties,StableNuclei, Binding Energy, Electron Orbit,Atomic Spectra, The BohrAtom.

Elementary particles: Introduction, Classification of elementary particles, Particle interactions,Conservationlaws(linear&angularmomentum,energy,charge,baryon number & lepton number), particles and antiparticles (Electrons and positrons, Protons and anti-protons, Neutrons and antineutrons, Neutrinos and anti-neutrinos), Photons, Mesons.

(15Lectures)

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Unit-IV

QuantumMechanics:OriginofQuantumtheory,Blackbody(definition),BlackBody Spectrum, Photoelectric effect, Wien's displacement law, Compton Effect Matter waves: De Broglie waves, Concept of wave packet, phase velocity, group velocity andtherelationbetweenthem,Wave-particleduality,Davisson-Germerexperiment, Heisenberg's uncertainty Principle.

(15Lectures)

SuggestedBooksandReferences–

1. PrinciplesofElectronics:V.K.MehtaandRohitMehta.S.Chand Publications. (11th Ed.)
2. HandBookofElectronics:GuptaandKumar
3. ConceptsofModernPhysics:ArthurBeiser,ShobhitMahajan,SRai Choudhury (6th Ed.) (TMH).
4. AtomicPhysicsbySNGhosal,SChand&Co.\
5. Atomic & Nuclear Physics: N Subrahmanyam, Brij Lal. (Revised by Jivan Seshan.) S. Chand & Co.
6. NuclearPhysics,D.C.Tayal(HimalayanPublishingHouse)5thed.
7. Quantum Mechanics by S. P. Singh, M. K. Badge and K. Singh, S. Chandand Company Ltd.
8. IntroductiontoQuantumMechanics:P.T.Mathews(TMH).
9. QuantumMechanicsTheoryandApplication:AKGhatakandSLoknathan

CourseLearningOutcomes:

Bytheendofthiscourse,studentswillbeableto:

1. UnderstandtheFundamentalsofElectricChargeandMagnetism
2. AnalyzetheBehaviorofSemi-Conductors
3. ComprehendRadioactivityandNuclearStructure
4. GrasptheConceptsofQuantumMechanics

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