



**GOVERNMENT ARTS COLLEGE (AUTONOMOUS)
COIMBATORE 641 018**

DEPARTMENT OF PHYSICS

B.Sc. PHYSICS

CURRICULUM AND SYLLABUS

**Under Choice Based Credit System (CBCS)
2018-2019 Onwards**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), COIMBATORE 641 018

DEPARTMENT OF PHYSICS

B.Sc. PHYSICS CURRICULUM FOR THE STUDENTS ADMITTED FROM 2018-2019 ONWARDS
UNDER CHOICE BASED CREDIT SYSTEM (CBCS)

SEMESTER - 1	S.No.	Subject Code	Part	Title of the Paper	Credit	Maximum Marks			Hrs/Week	Passing Minimum	
						Internal	External	Total		External	Total
	1.	18TAM11L	I	Language I - Tamil - Paper I	3	25	75	100	6	30	40
2.	18ENG12L	II	Language II - English - Paper I	3	25	75	100	6	30	40	
3.	18BPH13C	III	Core 1: Properties of Matter & Sound	5	25	75	100	5	30	40	
4.	18BPH14A	III	Allied I: Allied Mathematics - I	5	25	75	100	8	30	40	
5.	18ENV1GE	IV	Environmental Studies	2	25	75	100	2	30	40	
			Total	18			500	27			
6.		III	Core Practical I: General Experiments - I		Examination at the end of SECOND Semester			3			

SEMESTER - 2	S.No.	Subject Code	Part	Title of the Paper	Credit	Maximum Marks			Hrs/Week	Passing Minimum	
						Internal	External	Total		External	Total
	1.	18TAM21L	I	Language I - Tamil - Paper II	3	25	75	100	6	30	40
2.	18ENG22L	II	Language II - English - Paper II	3	25	75	100	6	30	40	
3.	18BPH23C	III	Core 2: Heat and Thermodynamics	5	25	75	100	5	30	40	
4.	18BPH24A	III	Allied I: Allied Mathematics - II	5	25	75	100	8	30	40	
5.	18BPH25P	III	Core Practical I: General Experiments - I	2	40	60	100	3	24	40	
6.	18VAL2GE	IV	Value Education	2	25	75	100	2	30	40	
			Total	20			600	30			

SEMESTER - 3	S.No.	Subject Code	Part	Title of the Paper	Credit	Maximum Marks			Hrs/Week	Passing Minimum	
						Internal	External	Total		External	Total
	1.	18TAM31L	I	Language I - Tamil - Paper III	3	25	75	100	6	30	40
2.	18ENG32L	II	Language II - English - Paper III	3	25	75	100	6	30	40	
3.	18BPH33C	III	Core 3: Mechanics	5	25	75	100	4	30	40	
4.	18BPH34A	III	Allied II: Allied Chemistry - I	4	15	60	75	5	24	30	
5.	18BPH35S	IV	Skill Based Elective - I: Energy Physics	3	25	75	100	4	30	40	
			Total	18			475	25			
6.		III	Core Practical II: General Experiments - II	Examination at the end of FOURTH Semester				2			
7.		III	Allied Practical: Allied Chemistry Practical	Examination at the end of FOURTH Semester				3			

SEMESTER - 4	S.No.	Subject Code	Part	Title of the Paper	Credit	Maximum Marks			Hrs/Week	Passing Minimum	
						Internal	External	Total		External	Total
	1.	18TAM41L	I	Language I - Tamil - Paper IV	3	25	75	100	6	30	40
2.	18ENG42L	II	Language II - English - Paper IV	3	25	75	100	6	30	40	
3.	18BPH43C	III	Core 4: Optics	5	25	75	100	4	30	40	
4.	18BPH44A	III	Allied II: Allied Chemistry - II	4	15	60	75	5	24	30	
5.	18BPH45S	IV	Skill Based Elective -II: Biomedical Instrumentation	3	25	75	100	4	30	40	
6.	18BPH46P	III	Core Practical II: General Experiments - II	2	40	60	100	2	24	40	
7.	18BPH47P	III	Allied Practical: Allied Chemistry Practical	2	20	30	50	3	12	20	
8.	18EXA4GE	V	Extension Activities: NCC/NSS/P.Ed./YRC	1							
			Total	23			625	30			

SEMESTER - 5	S.No.	Subject Code	Part	Title of the Paper	Credit	Maximum Marks			Hrs/Week	Passing Minimum	
						Internal	External	Total		External	Total
	1.	18BPH51C	III	Core 5: Mathematical Physics	5	25	75	100	4	30	40
	2.	18BPH52C	III	Core 6: Electricity and Magnetism	5	25	75	100	4	30	40
	3.	18BPH53C	III	Core 7: Electronics	5	25	75	100	4	30	40
	4.	18BPH54S	IV	Skill Based Elective - III: Digital Electronics and Microprocessor	3	25	75	100	4	30	40
	5.	18BPH5EL	IV	Non-Major Elective - I: Principles of Physics - I	2	25	75	100	3	30	40
				Total	20			500	19		
	6.		III	Core Practical III: General Experiments - III	Examination at the end of SIXTH Semester				3		
	7.		III	Core Practical IV: Analog Electronics and 'C' Programming	Examination at the end of SIXTH Semester				3		
8.		III	Core Practical V: Digital Electronics and Microprocessor	Examination at the end of SIXTH Semester				3			
9.		III	Project and Viva-voce	Examination at the end of SIXTH Semester				2			

SEMESTER - 6	S.No.	Subject Code	Part	Title of the Paper	Credit	Maximum Marks			Hrs/Week	Passing Minimum	
						Internal	External	Total		External	Total
	1.	18BPH61C	III	Core 8: Quantum Mechanics and Relativity	5	25	75	100	4	30	40
	2.	18BPH62C	III	Core 9: Solid State Physics and Nuclear Physics	5	25	75	100	4	30	40
	3.	18BPH63C	III	Core 10: Atomic Physics and Spectroscopy	5	25	75	100	4	30	40
	4.	18BPH64S	IV	Skill Based Elective - IV: Computer Programming in 'C'	3	25	75	100	4	30	40
	5.	18BPH6EL	IV	Non-Major Elective - II: Principles of Physics - II	2	25	75	100	3	30	40
	6.	18BPH65P	III	Core Practical III: General Experiments - III	2	40	60	100	3	24	40
	7.	18BPH66P	III	Core Practical IV: Analog Electronics and 'C' Programming	2	40	60	100	3	24	40
	8.	18BPH67P	III	Core Practical V: Digital Electronics and Microprocessor	2	40	60	100	3	24	40
9.	18BPH67V	III	Project and Viva-voce	15	20	80	100	2	32	40	
			Total	41			900	30			

Subject	Part	Number of Papers	Credit/Paper	Total Credits	Duration of Examination	Total Marks
Language I: Tamil	I	4	3	12	3 Hours	400
Language II: English	II	4	3	12	3 Hours	400
Core	III	10	5	50	3 Hours	1000
Core Practical	III	5	2	10	3 Hours	500
Allied - Mathematics	III	2	5	10	3 Hours	200
Allied - Chemistry	III	2	4	8	3 Hours	150
Allied Chemistry Practical	III	1	2	2	3 Hours	50
Project	III	1	15	15	---	100
Skill Based Elective	IV	4	3	12	3 Hours	400
Non-Major Elective	IV	2	2	4	3 Hours	200
Environmental Studies & Value Education	IV	2	2	4	3 Hours	200
Extension Activities	V			1	---	---
Total		37		140		3600

Year	Subject Title	Sem	Sub Code
2018-19 Onwards	Core 1: Properties of Matter and Sound	I	18BPH13C

Objective: To understand the basic properties of matter, laws of gravitation and the principles of acoustics.

UNIT 1: Elasticity

Bending of beams – Definitions – Expression for the bending moment – Depression for the loaded end of a cantilever – Depression at the mid-point of a beam loaded at the middle Uniform bending of a beam – Measurement of Young's modulus by Non-Uniform bending and Uniform bending – I section of girders.

Torsion of a body – Expression for torque per unit twist – Determination of rigidity modulus: Static torsion method (Searle's apparatus - Scale and telescope) and Dynamic torsion method.

UNIT 2: Hydrodynamics and Viscosity

Equation of continuity – Energy of the liquid – Euler's equation for unidirectional flow – Bernoulli's theorem – Explanation and Applications of Bernoulli's theorem.

Coefficient of Viscosity – Poiseuille's formula for the flow of a liquid through a capillary tube – Corrections to Poiseuille's formula – Searle's viscometer: Rotating cylinder method of finding coefficient of viscosity – Modification of Poiseuille's formula for gases.

UNIT 3: Surface Tension

Introduction – Explanation of Surface tension on Kinetic theory – Surface energy – Work

done in increasing the area of a surface – Work done in blowing a bubble – Angle of contact

Neumann's triangle – Excess pressure inside a curved liquid surface – Determination of surface tension of a liquid by Jaegar's method – Variation of surface tension with temperature – Quincke's method and Drop weight method of determining the surface tension of liquid – Problems in Work done and Excess pressure.

UNIT 4: Gravitation

Newton's law of gravitation – Kepler's laws of planetary motion – Determination of G by Boy's experiment – Gravitational field and gravitational potential – Gravitational potential and field due to a spherical shell – Gravitational potential and field due to a solid sphere – Variation of 'g' with latitude, altitude and depth – The compound pendulum (theory and experiment).

UNIT 5: Sound

Laws of Transverse vibrations in strings – Determination of frequency by Melde's method – Musical Sound and Noise – Characteristics of Musical Sound-Intensity of Sound.
Acoustics – Reverberation – Sabine's Reverberation formula – Determination of Absorption coefficient.

Ultrasonics – Piezo-electric effect and Magnetostriction effect – Production of Ultrasonics by Piezoelectric oscillator and Magnetostriction oscillator – Detection and Applications of Ultrasonic waves.

Books for Study:

1. Properties of Matter by R. Murugesan (Units 1,2,3 and 4)
2. A Textbook of Sound by Brijlal and Subrahmanyam (Unit 5), Vikas publishing
- 3.

Books for Reference:

1. Properties of Matter by N.Subrahmanyam, Brijlal, S.Chand and Co.
2. Waves and oscillations by N.Subrahmanyam, Brijlal, Vikas Publishing.
3. Properties of Matter and Acoustics by R.Murugesan and Kiruthiga Sivaprasath, S.Chand Publisher.

Year	Subject Title	Sem	Sub Code
2018-19 Onwards	Core 2: Heat and Thermodynamics	II	18BPH23C

Objective: To learn the basics of thermometry, kinetic theory of gases, thermodynamics and heat transfer mechanisms

UNIT 1:

Thermometry: Temperature coefficient of Resistance – Platinum Resistance Thermometer – Thermocouple – Seebeck Effect – Peltier Effect – Thermoelectric thermometer – Calorimetry – Thermoelectric diagrams - Specific heat of solids – Radiation correction – Copper block calorimeter – Nernst vacuum calorimeter – Newton's law of cooling – Specific heat capacity of a liquid by cooling – Specific heat capacity of gases – Relation between them – Joly's differential steam calorimeter – Continuous flow electric method.

UNIT 2:

Kinetic Theory of Gases: Postulates – Mean free path – Degree of freedom – Velocity distribution and Theorem of equipartition of energy – Viscosity of gases – Van der Waals equation – Critical constants and their determination

Low Temperature Physics: Joule-Thomson Effect – Liquefaction of air, hydrogen and helium – Helium I and II – Peculiar properties of He II – Adiabatic demagnetization

Superconductivity: Discovery – Critical Temperature – Meissner Effect – Isotope Effect – Applications

UNIT 3:

Thermodynamics: Carnot's Theorem – Otto Cycle – Petrol Engine – Diesel engine – Clapeyron's Latent heat equation – Entropy – Change in entropy (Reversible and irreversible process) – Temperature-Entropy diagram – Entropy of a perfect gas – Maxwell's thermodynamical relations and applications – Helmholtz function – Gibb's function – Enthalpy

UNIT 4:

Thermal Conduction: Conduction, convection and radiation – Coefficient of thermal conductivity, thermal diffusivity – Steady state – Lee's disc method of determining the thermal conductivity of a bad conductor – Searle's method – Forbe's method – Spherical Shell method – Cylindrical flow of heat – Thermal conductivity of rubber – Thermal conductivity of glass – Wiedemann-Franz law

UNIT 5:

Thermal Radiation: Black body – Kirchoff's law of heat radiation – Prevost's theory of heat exchange – Stefan's law – Mathematical derivation – Derivation of Newton's law of cooling from Stefan's law – Experimental verification of Stefan's law – Distribution of

energy in the spectrum of black body – Derivation of Planck's law – Derivation of Wien's law and Rayleigh-Jean's law from Planck's law

Book for Study:

1. Heat and thermodynamics by Brij lal and Subramaniam

Books for Reference:

1. Thermal Physics by R. Murugesan
2. Text book of heat by JB Rajam
3. Text book of heat by Saha

Year	Subject Title	Sem	Sub Code
2018-19 Onwards	Core Practical - I: General Experiments - I (Examination at the end of II- Semester) (Any12)	II	18BPH24P

Objective: *To understand the basic concepts of physics through experiments*

1. Young's Modulus – Non-Uniform bending (Pin & Microscope)
2. Young's Modulus – Uniform bending (Optic Lever)
3. Rigidity Modulus of a Wire – Torsion Pendulum (with mass)
4. Acceleration due to gravity – Compound Pendulum
5. Surface Tension of a Liquid and Interfacial Surface Tension of liquids – Drop Weight method
6. Viscosity of Highly Viscous Liquids – Stoke's method
7. A.C. Frequency – Sonometer
8. Specific Heat Capacity – Newton's Law of Cooling
9. Thermal Conductivity of a bad conductor – Lee's disc method
10. Refractive index – Solid Prism – Spectrometer
11. Refractive index – Liquid Prism – Spectrometer
12. Specific Resistance – Post-office Box
13. Calibration of Low Range Voltmeter - Potentiometer
14. Moment of a Magnet – Tan C Position
15. Magnetic flux – Field along the axis of a coil
16. Moment of a magnet – Field along the axis of a coil

Year	Subject Title	Sem	Sub Code
2018-19 Onwards	Core 3: Mechanics	III	18BPH23C

Objective: *To learn the basic concepts of mechanics and apply it to various physical problems*

UNIT 1: System of Particles

Dynamics of system of particles and concept of rigid bodies – Center of mass of rigid bodies – Linear Momentum – Angular Momentum – Torque – Work done by Torque – Conservation of linear momentum – Conservation of angular momentum – Collision – Elastic and inelastic collision – Coefficient of restitution – Rocket – Impulse – Impact – Direct and Oblique impact – Loss in Kinetic energy

UNIT 2: Dynamics of Rigid Bodies

Moment of Inertia – Theorem of Perpendicular and Parallel axes – Moment of inertia of a thin uniform Bar, Rectangular Lamina, Ring, Circular Disc, Solid sphere, Hollow sphere – Routh's Rule – Kinetic energy of body rolling on a Horizontal Plane – acceleration of a body rolling down an inclined Plane – Moment of Inertia of Fly Wheel and uses.

UNIT 3: Oscillations

Linear Harmonic Oscillator – Energy of simple Harmonic Oscillator – Simple harmonic Oscillations of Loaded Spring – LC Circuit – Helmholtz resonator – Lissajous Figures – Composition of two simple harmonic vibrations of equal time periods acting at right angles – Composition of two simple harmonic motions at right angles to each other and having time periods in the ratio 1:2 – Damped Harmonic Oscillators – Energy of damped harmonic oscillators.

UNIT 4: Statics

Friction – Force of friction – Laws of friction – Angle of friction – Resultant Reaction – Cone of friction – Motion of body on a rough inclined plane when i) Angle of inclination of the inclined plane is equal to angle of friction and ii) Angle of inclination of the inclined plane greater than the angle of friction – Center of Gravity – Center of gravity of solid cone – center of gravity of solid Hemisphere.

UNIT 5: Hydrostatics

Hydrostatic pressure – Hydrostatic pressure due to a liquid column – The Hydrostatic Paradox: A liquid transmit pressure equally in all directions – Pascal's law-Thrust on immersed plane – Center of Pressure – Change of depth of center of pressure – Expression for center of pressure of rectangular lamina with one side on the surface of the liquid – Principle of Archimedes – Laws of Flotation – Equilibrium of floating bodies – Stability of Equilibrium – Rolling and Pitching of ship – Determination of Metacentric Height of ship – Pressure due to Compressible fluid – Measurement of atmospheric pressure - Change of pressure with Altitude.

Books for Study

1. Mechanics and Electrodynamics by Brijlal, N.Subramanyam and Jivan Seshan, S.Chand Eurasia Publishing House (Pvt) Ltd (Unit 1, 2, and 3)
2. A text book of Mechanics by Narayanamoorthy and others (Unit 4)
3. Elements of Properties of matter by D.S.Mathur, S.Chand Eurasia Publishing House (Pvt) Ltd (Unit 5)

Books of Reference

1. Mechanics by R.Murugesan

Year	Subject Title	Sem	Sub Code
2018-19 Onwards	Skill Based Elective- I: Energy Physics	III	18BPH35S

Objective: *To understand the energy crisis and the alternative energy solutions*

UNIT 1: Introduction to Energy Sources

An Introduction to Energy Sources and their availability – Conventional energy sources – non-conventional energy sources – renewable energy sources – advantages of renewable energy – obstacles to the implementation of renewable energy systems – prospects of renewable energy sources.

UNIT 2: Solar Radiation and its Measurement

Introduction – solar constant – solar radiation at the Earth's surface – solar radiation measurements – solar radiation data – solar energy collectors – physical principles of the conversion of solar radiation into heat – flat-plate collectors – typical liquid collectors – typical air collectors –concentrating collector – focusing and non-focusing types – selective absorber coatings.

UNIT 3: Application of Solar Energy

Solar water heating-space heating – active and passive system – solar cooling – absorption – air-conditioning system – solar electric power generation – solar photovoltaic cells Application of solar energy in agricultural and industrial –solar distillation – solar pumping – solar furnace – solar cooking-simple box type cooker – concentric parabolic type solar cooker – Multi-reflector type solar cooker.

UNIT 4: Wind Energy

Basic principles of wind energy conversion – wind data and energy estimation-basic components of wind energy conversion system (WECS) – advantages and disadvantages of WECS – types of wind machines-horizontal axis wind machines – vertical axis wind machines – application of wind energy – environmental aspects – global warming.

UNIT 5: Renewable Energy Sources, Biomass and Biogas

Energy from the ocean: ocean thermal electric conversion (OTEC) – tidal energy – geothermal energy. Energy from biomass: biomass conversion technologies – wet and dry processes – photosynthesis; Biogas generation; introduction-basic processes and energetic – advantages of anaerobic digestion – factors affecting the bio-digestion and generation of gas.

Books for Study;

1. Non-conventional energy sources by G.D.Rai

Books for Reference:

1. Solar energy by M.P.Agarwal
2. Solar energy by S.P.Suhatme
3. Principles of solar engineering by Kreith & Krider

Year	Subject Title	Sem	Sub Code
2018-19 Onwards	Core 4: Optics	IV	18BPH43C

Objective: To expose the fundamental concepts of geometrical optics, wave optics and lasers.

UNIT 1: Geometrical Optics

Aberrations – Spherical aberration – Minimization of spherical aberration – Chromatic aberration in lenses – Longitudinal and lateral chromatic aberration – Condition for achromatism when two lenses are separated – Coma, Curvature, Distortion and Astigmatism (Qualitative treatment only)

Eyepieces – Huygen’s eyepiece – Ramsden’s eyepiece – Comparison of Ramsden eyepiece with Huygen’s eyepiece.

UNIT 2: Interference

Theory of interference fringes – Fresnel’s bi-prism – Interference due to reflected light – Condition for maxima and minima – Fringes produced due to wedge shaped films – Air wedge Determination of wedge angle and thickness of the spacer – Michelson’s interferometer – Determination of wavelength of a monochromatic source.

UNIT 3: Diffraction

Distinction between interference and diffraction – Fresnel diffraction – Rectilinear propagation of light – Zone plate – Action of zone plate for an incident spherical wave front – Difference between a zone plate and a convex lens – Distinction between Fresnel diffraction and Fraunhofer diffraction – Fraunhofer diffraction at a single slit – Plane diffraction grating – Theory – Determination of wavelength.

UNIT 4: Polarization

Polarisation– Plane of vibration-Plane of polarisation-Malus law-Double refraction-Huygen’s explanation of double refraction in uniaxial crystals-Optic axis – Positive and negative crystals – Nicol Prism – Nicol Prism as polarizer and analyser – Quarter wave plate – Half wave plate – Production and detection of plane, circularly polarized and elliptically polarized light – Optical activity – Specific rotation – Laurent’s half shade polarimeter – Determination of specific rotatory power of solution

UNIT 5: Lasers and Fibre Optics

Laser – Properties of laser – Induced absorption – Spontaneous and Stimulated emission – Einstein’s relation – Pumping – Population inversion – He-Ne laser – Carbon-di-oxide laser – Semiconductor laser – Application of laser – Optical Fibre – Principle – Structure – Merits – Total internal reflection – Critical angle – Acceptance angle – Numerical aperture – Step index fibre – Graded index fibre – Fibre optic communication system (Block diagram)

Book for Study:

1. A textbook of Optics by N. Subrahmanyam, Brijlal and MN Avadhanulu, S. Chand and Co. Ltd., New Delhi, Ed. 2006

Books for Reference:

1. Optics and Spectroscopy by R. Murugesan, S. Chand & Co. Ltd., New Delhi
2. Optoelectronics by Thiagarajan
3. Fundamentals of Optics by Jenkins and White.

Year	Subject Title	Sem	Sub Code
2018-19 Onwards	Skill Based Elective – II: Biomedical Instrumentation	IV	18BPH45S

Objective: To provide the student the knowledge of various instruments in medical field, their working and applications

UNIT 1: Human physiological systems

Cells and their structure – Transport of ions through the cell membrane – Resting and action potentials – Characteristics of resting potential – Bio-electric potentials – Nerve Tissues and organs – Different systems of human body – Skeletal, Circulatory, Respiratory, Digestive, Excretory, Regulatory, Reproductive and Muscular systems.

UNIT 2: Biopotential electrodes

Design of medical instruments – Components of the biomedical instrument system – Electrodes – Half cell potential, Electrode paste, Electrode material – Types of electrodes – Microelectrodes – Depth and Needle electrodes – Surface electrodes – Chemical electrodes.

UNIT 3: Transducers

Transducers – Types – Active transducers – Magnetic induction type – Piezoelectric type – Photovoltaic type – Thermoelectric type – Passive transducers – Resistive Transducers – Strain gauge – Photoresistor – Thermistor – Metallic wire transducers – Capacitive Transducers – Inductive Transducers – LVDT.

UNIT 4: Biopotential Recorders

Characteristics of the recording system – Writer and pen damping effects – Electrocardiography – Origin of cardiac action potential – ECG lead configurations – ECG recording set up – Practical consideration for ECG recording – Echocardiography – Electroencephalography – Origin of EEG – Brain waves – Placement of electrodes – EEG recording set up.

UNIT 5: Advances in Biomedical Instrumentation

Computers in medicine – Lasers in medicine – Basic principle – Laser instrumentation – Advantages in laser surgery – Photothermal applications – Photochemical applications – Endoscopes – Endoscopic laser coagulator- Cryogenic surgery – Nuclear imaging techniques – Computer Tomography – Principle – Block diagram –Applications of Computer Tomography.

Book for Study:

1. Biomedical Instrumentation by Dr. M. Arumugam, Anuradha Agencies.

Books for Reference:

1. Biomedical Instrumentation and Measurements by Cromwell, Weibl and Pfeiffer, Prentice Hall Inc., 1980.
2. EEG Technologies by Cooper, Osselton and Shaw, Butterworths, 1987.
3. Principles of Biomedical Instrumentation and Measurements by Aston, Merrill Pub. Co., 1990
4. Handbook of Biomedical Instrumentation by RS Khandpur, TMH, 1990.

Year	Subject Title	Sem	Sub Code
2018-19 Onwards	Core Practical - II: General Experiments - II (Examination at the end of IV- Semester) (Any15)	IV	18BPH46P

Objective: To improve the ability of observation and calculation skills in thermal, optical and electrical experiments

1. Young's Modulus – Uniform bending (Pin & Microscope)
2. Young's Modulus – Non-uniform bending (Optic Lever)
3. Rigidity Modulus – Static Torsion method
4. Acceleration due to gravity – Kater's Pendulum
5. Surface Tension of a Liquid – Capillary Rise method
6. Viscosity of Liquid - Capillary flow method
7. Determination of Frequency of a bar – Melde's method
8. Specific Heat Capacity – Joule's Calorimeter
9. Refractive index – Small Angle Prism – Spectrometer
10. Wavelength of mercury spectrum – Grating – Normal Incidence – Spectrometer
11. Refractive index – Solid Prism – i-d curve method – Spectrometer
12. Refractive index – Solid Prism – i-i' curve method – Spectrometer
13. Specific Resistance of a coil of wire – Meter Bridge
14. Calibration of low range ammeter – Potentiometer
15. Specific Resistance – Potentiometer
16. Calibration of high range voltmeter – Potentiometer
17. Thickness of a thin wire – Air Wedge
18. Radius of curvature of convex lens – Newton's Rings method
19. Figure of Merit of a B.G.
20. Absolute Capacity of a Condenser using B.G.

Year	Subject Title	Sem	Sub Code
2018-19 Onwards	Core 5: Mathematical Physics	V	18BPH51C

Objective: To understand the applications of mathematical concepts in solving physics problems

Unit 1: Vector Calculus in three dimensions

Gradient of a scalar field – Physical interpretation – Divergence of a vector function – Curl of a vector function and its physical significance – Laplacian operator – Laplace's equation – Gauss divergence theorem – Stokes's theorem – Green's theorem

Unit 2: Matrices

Introduction – Special types of matrices – Transpose of a matrix – The conjugate of a matrix – Conjugate transpose of a matrix – Symmetric and Antisymmetric – Hermitian and skew Hermitian – Orthogonal and unitary matrices – Properties – Characteristics equation – Roots and characteristics vector – Diagonalization of matrices – Cayley-Hamilton theorem – Problems.

Unit 3: Special Functions

Beta and Gamma functions – Different forms of beta and gamma functions – relation between beta and gamma functions – Evaluation of $\Gamma(n)$ and $\beta(m,n)$ functions, Dirac Delta function – some representations of delta function, properties of delta function, Fourier Transform of delta function, Laplace Transform of delta function

Unit 4: Lagrangian Formulation

Constraints and their classification – Degrees of freedom – Generalised co-ordinates – Generalized displacement, velocity, momentum and force – Principle of virtual work and D'Alembert's Principle – Lagrangian equation of motion from D'Alembert's Principle – Application of Lagrangian equation to simple pendulum, Compound pendulum, Linear harmonic oscillator and Atwood's machine.

Unit 5: Hamiltonian Formulation

Phase space – Hamiltonian function H – Hamilton's canonical equations of motion – Physical significance of H – Applications of Hamilton's equation to Simple pendulum, Compound pendulum, Linear Harmonic Oscillator and particle in a central force field – Poisson's bracket and its properties.

Books for Study:

1. Mathematical Physics with Classical Mechanics by Sathyaprakash, Sultan Chand & Sons (Units 1 and 3)

2. Numerical Methods by P.Kandasamy, K.Thilagavathy and K.Gunavathi, Sultan Chand & Co. (Unit 2)
3. Classical Mechanics by Gupta, Kumar and Sharma (Units 4 and 5)

Books for Reference:

1. Mathematical Physics by Rajput, Pragati Prakashan
2. Mathematical Physics by Harper, Eastern Economy Edition.

Year	Subject Title	Sem	Sub Code
2018-19 Onwards	Core 6: Electricity and Magnetism	V	18BPH52C

Objective: To provide basic understanding of electricity and magnetism.

UNIT 1: Electrostatics

Gauss's Law – Proof – Field due to a uniformly charged hollow cylinder – Mechanical force experienced by unit area of a charged conductor – Calculation of increase in radius of electrified soap bubble – Deduction of Coulomb's inverse square law from Gauss's Law – Electrical images – Definition – Magnitude and location of image charge – Electric potential and electric field at an external point – Electric field at a point on the surface of the sphere – Surface density of charge on the sphere – Force of attraction between the charge +q and the sphere by the method of electrical images – Poisson's and Laplace's equations

UNIT 2: Capacitors and Electrometers

Capacitance of a conductor – Principle of a Capacitor – Capacitance of a spherical capacitor (outer, inner sphere earthed) – Capacitance of cylindrical and parallel plate capacitors – Effect of a dielectric – Capacitors in series and parallel – Energy stored in a charged capacitor – Loss of energy on sharing of charges between two capacitors – Guard ring capacitor – Kelvin's absolute electrometer – Measurement of potential difference between two given points – The Quadrant electrometer – Construction and working (no derivation)

UNIT 3: Magnetic effects of electric current

Fleming's left hand rule – The Biot-Savart Law – Force on a current carrying conductor in a magnetic field – Force between two parallel current carrying conductors – Force experienced by an electron moving in a magnetic field – Moving coil Ballistic Galvanometer – correction for damping – Figure of merit of a B.G – Comparison of two capacitance using B.G – Ampere's circuital law – Differential form of Ampere's law – Magnetic field inside a long solenoid – Magnetic induction due to a toroid.

UNIT 4: Electromagnetic Induction and Dynamics of charged particles

Faraday's laws of electromagnetic induction – Lenz's law – Fleming's right hand rule – Self-inductance and its determination by Rayleigh method – Mutual inductance and its experimental determination

Growth and decay of current in a circuit containing a resistance and inductance – Motion of charged particle in uniform constant magnetic field – Motion of charged particle in crossed electric and magnetic fields

UNIT 5: Magnetism

Permeability and susceptibility – Relation between relative permeability and susceptibility – Determination of susceptibility by Guoy's method and Curie – balance method – Experiment

to draw M-H curve (horizontal model) – Energy loss due to hysteresis – the importance of hysteresis curves – magnetic circuit – magnetic circuit of an electromagnet

Books for Study:

1. Electricity and Magnetism by R.Murugesan

Books for Reference:

1. Electricity and Magnetism by Brijlal and Subrahmanyam
2. Electricity and Magnetism by DC Dayal
3. Electricity and Magnetism by Tewari

Year	Subject Title	Sem	Sub Code
2018-19 Onwards	Core 7: Electronics	V	18BPH53C

Objective: To understand the working, characteristics and applications of some basic semiconductor devices and operational amplifier

UNIT 1: Diodes, Rectifiers and Filters

Characteristics of PN Junction diode – Zener Diode – Zener Voltage Stabilization – Half Wave Rectifier – Efficiency and Ripple Factor – Centre-tapped Full-wave Rectifier – Bridge Rectifier – Efficiency and Ripple Factor.

Filter Circuits: Capacitor Filter – Choke input Filter – Capacitor input Filter (Pi Filter).
Special Purpose Diodes: Light Emitting Diode – Photodiode – Tunnel Diode.

UNIT 2: Transistors and Transistor Biasing

Transistor action – Expression for collector current in common base and common emitter connections – Relation between α and β – Characteristics of CE connection – Transistor load line analysis: DC load line – Operating point.

Transistor biasing – Stabilization – Essentials of a transistor biasing circuit – Stability factor – Base resistor method of transistor biasing – Voltage divider bias method.

UNIT 3: FET, SCR and UJT

JFET – Difference between JFET and BJT – Principle and working of JFET – Output characteristics – Important terms – Parameters of JFET.

MOSFET – Types of MOSFET – Circuit operation of D-MOSFET – D-MOSFET Transfer characteristics – E-MOSFET.

SCR – Working – V-I characteristics of SCR – Important terms – SCR as a switch.

UJT – Construction and operation – Characteristics of UJT – Advantages – UJT as Relaxation Oscillator.

UNIT 4: Amplifiers and Oscillators

Classification of amplifiers – RC coupled transistor amplifier – Transformer-coupled amplifier – Direct coupled amplifier – Difference between voltage and power amplifiers – Class A, B and C power amplifiers – Maximum collector efficiency of transformer coupled class A power amplifier – Thermal runaway – Heat sink – Push-pull amplifier.

Sinusoidal Oscillator – Types – Oscillatory circuit – Positive feedback – Barkhausen criterion – Colpitt's oscillator – Hartley oscillator – Phase shift oscillator – Wien Bridge oscillator.

UNIT 5: Operational Amplifier

What is an Operational Amplifier? – Operational Amplifier symbol – Ideal Operational Amplifier – Virtual Ground and Summing Point – Inverting Amplifier – Non-inverting Amplifier – Unity Follower – Adder – Subtractor – Integrator – Differentiator – Comparator.

Book for Study:

1. Principles of Electronics by VK Mehta and Rohit Mehta, S. Chand & Co. Ltd., 2005 (Units 1 – 4)
2. Basic Electronics (Solid State) by B.L. Theraja, S. Chand & Co. Ltd. (Unit 5)

Books for Reference:

1. Handbook of Electronics, Gupta and Kumar, Pragati Prakashan, Meerut
2. A textbook of Applied Electronics by R.S. Sedha, S. Chand & Co. Ltd.

Year	Subject Title	Sem	Sub Code
2018-19 Onwards	Skill Based Elective-III: Digital Electronics and Microprocessor	V	18BPH54S

Objective: To provide the knowledge on the principles and design of digital circuits and to impart basic knowledge on the functioning of microprocessors.

UNIT 1: Number Systems, Binary Arithmetic and Codes

Binary numbers – Octal numbers - Hexadecimal numbers (Conversion of one number system into other) – Arithmetic operations – Binary addition – Binary subtraction – 1’s complement subtraction – 2’s complement subtraction

Codes – Binary coded decimal – BCD addition and subtraction – Weighted binary codes – Non-weighted codes – Excess 3 codes – Gray code – Error detection and correction codes – ASCII & EBCDIC Codes.

UNIT 2: Logic Gates, Boolean algebra and Minimization techniques

Logic Gates – AND, OR, NOT, Ex-OR, NOR, NAND – Universal Building Blocks – Laws of Boolean algebra – Boolean addition and multiplication – Properties of Boolean algebra – De Morgan’s theorems.

Minimization and Boolean expressions – Minimization using algebraic method – SOP and POS – Minterm – Maxterm – Karnaugh map (upto four variables only).

UNIT 3: Arithmetic circuits and Flip-flops

Arithmetic circuits – Half adder – Full adder – Half-subtractor – Full-subtractor – K-map simplifications – Parallel binary adder – Parallel binary subtractor – Binary to Gray code converter – Gray to Binary converter.

SR flip-flop – Clocked SR flip-flop – D flip-flop – JK flip-flop – T flip-flop – Triggering of flip-flops – Level triggering – Edge triggering – Master-Slave JK flip-flop

UNIT 4: Applications of Flip-flops, A/D and D/A Converters

Applications: Shift Registers – 3 and 4 bit shift registers – Counters – 4 bit Ripple binary counter – MOD 3 counters – MOD 6 counters and Decade counter (all MOD counters using JK flip-flop only).

A/D Converters – Simultaneous type and counter type – D/A Converters – Weighted resistor type – R-2R ladder type

UNIT 5: Microprocessors

8085 microprocessors – Architecture – Demultiplexing the Bus AD₇-AD₀ – the ALU – 8085 Instructions – Data transfer, Arithmetic, Logical, Branch and Miscellaneous instructions – ALP for Addition, Subtraction, Multiplication and Division

Book for Study:

1. Digital Circuits and Design by S.Salivahanan and S.Arivazhagan,Vikas Publishing House (Units 1 to 4)
2. Microprocessor Architecture, Programming and Applications with 8085 by Ramesh Gaonkar, Fifth Edition, Pentam International Publishing (India) Pvt. Ltd. (Unit 5)

Books for Reference:

1. Digital principles and Applications by Malvino and Leach
2. Digital Computer Design by MorisMano,PHT
3. Digital Electronics by Gothmann,Macmillan Publications
4. Introduction to Microprocessors by AP Mathur, PHI

Year	Subject Title	Sem	Sub Code
2018-19 Onwards	Core 8: Quantum Mechanics and Relativity	VI	18BPH61C

Objective: *To understand the basics of quantum mechanics and the theory of relativity.*

Unit 1: Foundation of Wave Mechanics

Dual nature of light and matter – Experimental evidences for matter waves – Davisson and Germer experiment – G.P. Thomson's experiment – Velocity of de Broglie waves: Quantum picture of a material particle - Relation between group velocity and phase velocity for a non-relativistic free particle – Equation of motion of matter waves – Time dependent and time-independent Schrodinger's equation – Physical interpretation of the wave function.

Unit 2: Applications of Schrödinger equation

Normalized and Orthogonal wave function – Conditions satisfied by a wave function – Solution of the Schrödinger equation – Expectation values of dynamical quantities – Probability current density: Particle flux – Ehrenfest's theorem – The free particle – Particle in a box (one dimensional case) – Rectangular potential Barrier – Application of Barrier penetration (α -Decay) – One dimensional Linear Harmonic Oscillator.

Unit 3: Uncertainty principle & Operators

The uncertainty principle – Examples of position-momentum uncertainty – Proof of uncertainty principle for one dimension wave packet – Application of uncertainty principle – The Non-existence of the electron in the Nucleus – Light quanta - Eigen values and Eigen functions – The operator formalism in Quantum mechanics – Momentum operator – Hamiltonian operator – Hermitian operators – Properties of Hermitian operators – Commutation relation between (i) Position and momentum (ii) Hamiltonian and momentum (iii) Components of orbital angular momentum (iv) Ladder operators.

UNIT 4: General Theory of Relativity

Frames of reference – Newtonian Relativity – Galilean Transformation equations – Michelson-Morley experiment and explanation of the negative result – General theory of relativity – Effect of gravitational field on a ray of light – Gravitational red shift – Black hole.

UNIT 5: Special Theory of Relativity

Postulates of special theory of relativity – Lorentz transformation equations – Length contraction – Time dilation – Addition of velocities – Variation of mass with velocity – Mass energy equivalence – Minkowski's for dimensional space.
Tensor: Covariant – Contravariant – Mixed tensors.

Books for Study:

1. Quantum Mechanics by S.P. Singh and Bagde (Unit 1 & 2)
2. Modern Physics by R.Murugesan and Krithika Sivaprasath (Units 3, 4 and 5)

Books for Reference

1. Quantum Mechanics by Sathyaprakash and Swathi Saluja
2. Relativistic Mechanics by Gupta and Prakash
3. Modern Physics by Beiser
4. Quantum Mechanics – Satya Prakash & Swathi Saluja Kedar Nath Ramnath & Co., Meerut, edition 2007.

Year	Subject Title	Sem	Sub Code
2018-19 Onwards	Core 9: Solid State Physics and Nuclear Physics	VI	18BPH62C

Objective: To provide an understanding of the physics of condensed matter and nuclear physics.

UNIT 1:

Structure of Solids: Crystalline and amorphous solids – Crystal structure: Basis and crystal structure – Primitive lattice cell and unit cell – Bravais lattices in two dimensions and in three dimensions – Lattice planes and Miller indices – Inter-planar distance – Spacing between planes in SC, FCC and BCC – Atomic packing – Atomic radius – Lattice constant and density – Crystal structures (SC, FCC, BCC, HCP, Diamond)

UNIT 2:

X-ray Diffraction: Bragg's law – Laue method – Rotating crystal method – Powder photograph method.

Bonding in Solids: (Qualitative treatment) Ionic – Covalent – Metallic – Molecular bonds.

Crystal Defects: (Qualitative Study) Frenkel defect – Schottky defect – Edge dislocation – Screw dislocation

UNIT 3:

Introduction to the Nucleus: General properties of Nucleus – Binding energy – Nuclear stability – Nuclear forces – Liquid drop model – Bohr Wheeler theory – Semi empirical mass formula – Shell model – Nuclear forces – Yukawa's Meson theory of nuclear forces.

Radioactivity: Natural Radioactivity – Alpha, Beta and Gamma rays – Properties- Laws of Radioactivity – Soddy-Fajan's displacement law – Law of successive disintegration – Transient and secular equilibrium- Artificial Radioactivity – Preparation of radio isotopes – Application of radio isotopes.

UNIT 4:

Particle accelerators: Linear accelerator – Synchrocyclotron – Betatron.

Detectors: Solid state detectors – Proportional counter – Wilson's cloud chamber – Bubble chamber – Neutron – Discovery – Properties – Thermal neutrons and fast neutrons.

UNIT 5:

Nuclear fission: Nuclear fission – Energy released in fission – Chain reaction, Multiplication factor and critical size – Atom bomb – Nuclear reactors – Breeder reactor.

Nuclear Fusion: Nuclear Fusion – Carbon-Nitrogen cycle – Proton-proton cycle – Thermonuclear reactions – Transuranic elements.

Elementary particles: Classification – Particles and antiparticles – Fundamental interactions –Elementary particle quantum number – Conservation laws – Quarks

Books for Study:

1. Solid State Physics by Gupta, Kumar, Nath & Co.
2. Modern Physics by Murugesan

Books for Reference:

1. Nuclear Physics by D.C. Tayal
2. Introduction to Solid State Physics by Charles Kittel, Wiley Eastern Ltd.

Year	Subject Title	Sem	Sub Code
2018-19 Onwards	Core 10: Atomic Physics and Spectroscopy	VI	18BPH63C

Objective: To enable the students to understand the fundamental concepts of atomic physics and spectroscopy

Unit 1: Structure of the Atom

Bohr atom model – Postulates – The Bohr formulae – Calculation of total energy – Bohr's interpretation of hydrogen spectrum – Spectral series of hydrogen atom – Effect of nuclear motion on atomic spectra – Evidences in favour of Bohr's theory – Ritz combination principle – Bohr's correspondence principle – Sommerfeld's relativistic atom model – Elliptical orbits for hydrogen – Expression for total energy – Fine structure of H_{α} line

Unit 2: Vector Atom Model

Spatial quantization – Spinning electron – Quantum numbers associated with vector atom model – Coupling schemes – L-S coupling – The j-j coupling – The Pauli's Exclusion principle – Magnetic dipole moment due to orbital motion of the electron – Magnetic dipole moment due to spin – The Stern and Gerlach experiment

Unit 3: Effect of magnetic and electric field on the spectrum of an atom

Optical spectra – Spectral notation – fine structure of sodium D-line – Hyperfine structure – Zeeman Effect – Experimental arrangement for normal Zeeman effect – Lorentz classical theory of normal Zeeman effect – Expression for Zeeman shift – Larmor's theorem – Quantum mechanical explanation of normal Zeeman effect – Explanation of Anomalous Zeeman effect – Stark effect – Paschen Back effect

Unit 4: Photoelectric Effect

Lenard Method of determination of e/m of photoelectrons – Richard and Compton experiment – Laws of photoelectric emission – Failure of electromagnetic theory – Einstein's Photo electric equation – Experimental verification of Einstein's Photoelectric equation by Millikan's Experiment – Photoelectric cells – Photo emissive cell – Photovoltaic cell – Photoconductive cell – Photomultiplier – Applications of photoelectric cell

Unit 5: X-ray and Molecular spectra

X-ray spectra – Continuous X-ray spectrum – Characteristic X-ray spectrum – Moseley's law – Compton scattering – Experimental verification – Molecular spectra – Theory of origin of pure rotational spectrum of a diatomic molecule – Theory of origin of the vibration-rotation spectrum of a diatomic molecule – Electronic spectra of molecules – Rayleigh's scattering – Raman effect – Experimental study of Raman effect – Quantum theory of Raman effect – Applications

Books for Study:

1. Modern Physics by R.Murugesan and Kiruthiga Sivaprasath (S.Chand & Company, Delhi)

Books for Reference:

1. Concepts of Modern Physics by Arthur. Beiser (Tata Mc-Graw Hill, New Delhi)
2. Atomic Physics by J.B. Rajam (S.Chand & Company, Delhi)
3. Elements of spectroscopy by Gupta, Kumar and Sharma (Pragati Prakashan, Meerut)

Year	Subject Title	Sem	Sub Code
2018-19 Onwards	Skill Based Elective-IV: Computer Programming in 'C'	VI	18BPH64S

Objective: To introduce 'C' Program by explaining its appropriate character set and expressions and to improve the programming skill for the application of mathematical and physical concepts.

UNIT 1:

Character set – C tokens – Keywords and identifiers – Constants – Variables – Data types (primary data types) – Declaration of variables.

Relational operators – Logical operators – Assignment operators – Increment and decrement operators – Conditional operator.

Arithmetic expressions – Evaluation of expressions – Precedence of arithmetic operators – Operator precedence and associativity – Mathematical functions.

UNIT 2:

Reading a character – Writing a character – Formatted input – Formatted output – Simple 'if' statement – 'if...else' statement – Nesting 'if...else' statement – 'switch' statement – 'go to' statement – 'while' statement – 'do' statement – 'for' statement.

UNIT 3:

One dimensional arrays – Two dimensional arrays – Declaring and initializing string variables – Reading strings from terminal – Writing strings to screen – String handling functions – Need for user defined functions – The form of C functions – Category of functions – No arguments and no return values – Arguments but no return values – Arguments with return values.

UNIT 4:

Structure definition – Giving values to members – Structure initialization.

Understanding pointers – Accessing the address of a variable – Declaring and initializing pointers – Accessing a variable through its pointer.

File management – Introduction – Defining and opening a file – Closing a file – Input/Output operations using fprintf and fscanf functions.

UNIT 5:

Conversion of Centigrade temperature to Fahrenheit and Fahrenheit to Centigrade temperature – The acceleration due to gravity as a function of altitude – Solution of quadratic equation – Arranging the elements of an array in the ascending and descending order – Matrix addition, Subtraction and Multiplication.

Books for Study:

- 1) Programming in ANSI C by E. Balagurusamy
- 2) Let us C by Yashavant Kanetkar

Books for Reference:

- 1) The spirit of C by Mullish Cooper
- 2) Programming in C by Kris A. Jansa

Year	Subject Title	Sem	Sub Code
2018-19 Onwards	Allied II: Allied Physics-I	VI	18BCH34A 18BMA34A

Objective: This paper is offered to the students of mathematics and chemistry to understand, appreciate and apply the concepts of physics in their major.

UNIT 1: Mechanics

Impact of elastic bodies – impulse – Direct and oblique impact of two spheres – Loss of kinetic energy due to direct impact of two smooth spheres

Moment of inertia of a spherical shell about a diameter – Moment of inertia of a uniform solid cylinder – Theory of compound pendulum – Experimental determination of acceleration due to gravity using compound pendulum

UNIT 2: Statics and Hydrostatics

Laws of friction – Angle and cone of friction – Motion up and down on a rough inclined plane (external force applied parallel to the plane)

Centre of pressure (Definition) – Centre of pressure of a rectangular lamina – Centre of pressure of a triangular lamina (Vertex in the surface of the liquid)

Stability of equilibrium of a floating body – Metacentre – Metacentric height – Determination of Metacentric height of a ship

UNIT 3: General Physics and Sound

Gravitation – Newton's law of gravitation – Gravitational constant – Determination of G by Boy's method – Variation of 'g' with altitude, depth and latitude

Bending moment – Depression at the free end of a cantilever – Hooke's law – Kinds of moduli of Elasticity – Experimental determination of Young's Modulus by Uniform and Non-Uniform bending methods

Determination of frequency of a tuning fork (Transverse and longitudinal modes) – Frequency of AC by sonometer – Production of ultrasonic waves by piezo electric method – Applications of Ultrasonics

UNIT 4: Thermal Physics

Specific heat capacities of a gas (C_p and C_v) – Relation between them – Joule -Kelvin effect – Theory of porous plug experiment – Temperature of inversion

Liquefaction of air (Linde's process) – Liquefaction of hydrogen – Liquefaction of Helium – Properties of liquid Helium I and Helium II

Second law of thermodynamics – Carnot's theorem and its proof Thermal conductivity of a bad conductor by Lee's disc method

UNIT 5: Optics

Coherent sources – Phase difference and path difference – Theory of interference fringes – Fringes produced by a wedge shaped thin film

Holography Introduction-Recording of a hologram and viewing hologram – Applications of holography

Polarization – Optical activity – Specific rotation – Laurent's half shade polarimeter – Determination of specific rotation of sugar solution

Books for Study:

1. Mechanics by Narayanamoorthy (Units 1 & 2)
2. Properties of Matter and Sound by R. Murugesan (Unit 3)
3. Heat and Thermodynamics by Brijlal and Subrahmanyam (Unit 4)
4. Optics by Brijlal and Subrahmanyam (Unit 5)

Year	Subject Title	Sem	Sub Code
2018-19 Onwards	Allied II: Allied Physics-II	VI	18BCH44A 18BMA44A

Objective: This paper is offered to the students of mathematics and chemistry to understand, appreciate and apply the concepts of physics in their major.

UNIT 1: Electricity and Magnetism

Statement of Gauss Law – Electric field due to an uniformly charged sphere – Principle of a Capacitor – Capacitance of a spherical capacitor (Outer and inner sphere earthed) – Energy stored in a charged capacitor – Magnetic induction – Magnetisation – Magnetic susceptibility – Magnetic permeability – Properties of Dia, Para, Ferro, Ferri and Antiferromagnetic materials – Definition of Hysteresis – Experiment to draw M-H curve – Magnetic properties of soft iron and steel

UNIT 2: Magnetic Effects of Current

Biot-Savart law – Fleming's Right hand rule – Magnetic induction at a point on the axis of a circular coil carrying current – Fleming's Left hand rule – Force on a current carrying conductor in a magnetic field – Force between two parallel current carrying conductors – Definition of ampere – Moving coil ballistic Galvanometer: Principle, Construction, Theory – Ampere's circuital law – Magnetic field inside a long solenoid

UNIT 3: Modern Physics

Properties of cathode rays and positive rays – Positive ray analysis by Thomson's parabola method – Photoelectric effect – Laws of photoelectric emission – Einstein's photoelectric equation – Millikan's Experimental verification – Photoelectric cells

Natural and artificial radioactivity – Applications of radioisotopes – Nuclear fission – Energy released in fission – Nuclear fusion – Energy released in fusion

UNIT 4: Electronics

PN junction diode – Zener diode-Characteristics – Special Purpose Diodes: LED – Photodiode -Transistor characteristics (CE mode)- JFET – Difference between JFET and BJT – Principle and working of JFET – output characteristics – Parameters of JFET – SCR – Working – V-I characteristics of SCR.

UNIT 5: Digital Electronics

Number systems – Binary system – Addition-Subtraction – 1's and 2's Complement method of Subtraction – Multiplication – Division – Binary-to-decimal and decimal-to-binary conversion – AND, OR, NOT gates – NAND and NOR as universal gates – XOR gate – Laws of Boolean algebra – Simplification of Boolean expressions – De Morgan's theorems

Books for Study:

1. Electricity and Magnetism by R. Murugesan (Units 1 & 2)
2. Modern Physics by R. Murugesan (Unit 3)
3. Principles of Electronics by V.K. Metha (Unit 4)
4. Modern Physics by R.Murugesan and Kiruthiga Sivaprasath (Unit 5)

Books for Reference:

1. Electricity and Magnetism by Brijlal & Subrahmanyam
2. Digital Principles and Applications by Malvino

Year	Subject Title	Sem	Sub Code
2018-19 Onwards	Non-Major Elective – I: Principles of Physics – I	V	18BPH5EL

Objective: This paper is offered to the students without physics background to enable them to understand the concepts of physics and to face the competitive examinations with confidence.

UNIT 1: Mechanics

Particle – Rest and Motion – Motion in one, two and three dimensions – Position, displacement and distance – Speed and Velocity – Acceleration – Momentum – Force – Equations of Motion – Newton’s Laws of motion – Applications of Newton’s Laws of motion

UNIT 2: Electromagnetic Waves

Characteristics – Hertz experiment – Electro Magnetic Spectrum – uses – types of spectra – Fluorescence – Phosphorescence – Raman Effect – Applications

UNIT 3: Heat

Heat energy – Units – Specific heat capacity – Newton’s law of cooling – Boyle’s law – Charle’s law – Gas equation – Kinetic theory of gases – Postulates – Degree of freedom – Isothermal and Adiabatic processes

UNIT 4: Sound

Transverse and longitudinal waves – Relation between frequency, wavelength and velocity – Doppler Effect (quantitative idea) – Applications – Laws of transverse vibration of stretched strings – Ultrasonics – Applications – Reverberation – Acoustics of buildings

UNIT 5: Optics

Lens – Types – Defects of eye – Laws of reflection and refraction – Conditions for total internal reflection – Dispersion – Scattering – Rayleigh scattering – Colour of the sky – Raman Effect

Books for Study:

1. Textbook of Mechanics Part I and Part II by Narayanamoorthy
2. Heat and Thermodynamics by BrijLal and Subrahmanyam
3. Textbook of Sound by BrijLal and Subrahmanyam
4. Optics and Spectroscopy by R.Murugesan

Books for Reference:

1. Principles of Physics by BrijLal and Subrahmanyam

Year	Subject Title	Sem	Sub Code
2018-19 Onwards	Non-Major Elective – II: Principles of Physics – II	VI	18BPH6EL

Objective: This paper is offered to the students without physics background to enable them to understand the concepts of physics and to face the competitive examinations with confidence.

UNIT 1: Gravitation

Newton's law of gravitation – Universal Gravitation constant – Acceleration due to gravity – Variation of 'g' with altitude – Inertial mass – gravitational mass –Orbital velocity – Time period of a satellite – Uses of satellites

UNIT 2: Properties of Matter

Elasticity: Stress – Strain – Elastic limit – Hooke's law – Experimental verification of Hooke's Law – Three moduli of elasticity – Pascal's law – Applications

Viscosity: Coefficient of Viscosity – Streamline flow and turbulent flow – Reynold's number – Stoke's law

Surface Tension: Forces of cohesion and adhesion – Experimental determination of surface tension of water by capillary rise method – Applications

UNIT 3: Electricity and Magnetism

Electric current – Current density – Ohm's law – Electrical resistivity and Conductivity – Resistance – Resistors in series – Resistors in parallel – Kirchoff's law – Faraday's laws – Basic properties of magnets – Magnetic moment –Magnetic field – Magnetic induction – Properties of Dia, Para and Ferromagnetism – comparison – Magnetic lines of force

UNIT 4: Modern Physics

Nucleus: Nuclear Structure – Mass Number – Atomic Number – Nuclear Mass – Binding Energy – Nuclear Fission and Fusion – Atom Bomb and Hydrogen Bomb

X-rays: Properties of X-rays and its applications – Radioactivity – Properties of alpha, beta and gamma rays – Half –life period – Applications

UNIT 5: Communication Systems

Modes of propagation, ground wave – Sky wave propagation Radio transmission and reception – TV transmission and reception Radar – Principle – Applications.

Books for Study:

1. Properties of Matter by R. Murugesan
2. Electricity and Magnetism by Brijlal and Subrahmanyam
3. Modern Physics by R. Murugesan
4. Principles of Electronics by V.K. Mehta

Books for Reference:

1. Principles of Physics by Brijlal and Subrahmanyam

Year	Subject Title	Sem	Sub Code
2018-19 Onwards	Core Practical - III: General Experiments – III (Examination at the end of VI- Semester) (Any12)	VI	18BPH65P

Objective: To ensure confidence in handling physical equipment for accurate measurements and analysis

1. Young's Modulus – Koenig's Method – Non-uniform bending
2. Young's Modulus – Koenig's Method – Uniform bending
3. Young's Modulus – Cantilever – Static Method
4. Young's Modulus – Cantilever – Dynamic Method
5. Cauchy's Constants – Spectrometer
6. Dispersive Power of a Grating – Spectrometer
7. Dispersive Power of a Prism – Spectrometer
8. Hartmann's Interpolation Formula – Spectrometer
9. Solar Spectrum – Wavelength of Fraunhofer lines – Spectrometer
10. Refractive index of a lens – Newton's Rings method
11. EMF of a thermocouple - Potentiometer
12. Specific Resistance – Carey Foster's Bridge
13. Quality factor of a Coil – Series Resonance Circuit
14. Quality factor of a Coil – Parallel Resonance Circuit
15. Comparison of mutual inductance of coils – B.G.
16. Self-inductance of a Coil – Anderson's Bridge

Year	Subject Title	Sem	Sub Code
2018-19 Onwards	Core Practical - IV: Analog Electronics and 'C' Programming (Examination at the end of VI- Semester) (Any12)	VI	18BPH66P

Objective: To provide knowledge and skill in analog electronic experiments and implementation of 'C' language..

Analog Electronics

1. Characteristics of Junction and Zener diodes
2. Construction of IC Regulated Power supply using IC78XX
3. Transistor Characteristics – Common Emitter configuration
4. Hartley Oscillator using Transistor
5. Astable multivibrator
6. JFET – Transfer Characteristics
7. UJT – V-I characteristics
8. Summing Amplifier using Operational Amplifier
9. Differential Amplifiers using Operational Amplifier
10. Integrator and Differentiator using Operational Amplifier
11. Colpitt's Oscillator using Operational Amplifier
12. Phase Shift oscillator using Operational Amplifier
13. Op-Amp as Digital to Analog converter

'C' Programs for

14. Conversion of centigrade temperature to Fahrenheit temperature and Fahrenheit temperature to centigrade temperature
15. Solution of Quadratic equation
16. Ascending and descending order using an array
17. Matrix Addition and Subtraction
18. Factorial Program
19. Acceleration due to gravity

Year	Subject Title	Sem	Sub Code
2018-19 Onwards	Core Practical - V: Digital Electronics and 8085 Microprocessor (Examination at the end of VI Semester) (Any12)	VI	18BPH67P

Objective: To provide knowledge and skill in digital electronic experiments and 8085 microprocessor assembly.

Digital Electronics

1. Verification of truth tables of OR, AND, NOT, NAND, NOR and Ex-OR gates (Using ICs)
2. Verification of truth tables of OR, AND, NOT, NAND, NOR and Ex-OR gates (Using Discrete Components)
3. Verification of De Morgan's Theorems
4. NAND as Universal Building Block
5. NOR as Universal Building Block
6. Half Adder and Full Adder
7. Half Subtractor and Full Subtractor
8. Binary to Gray and Gray to Binary converters
9. Construction of SR and JK Flip-flop using NOR gates

8085 Microprocessor

10. Addition of two 8 bit numbers
11. Subtraction of two 8 bit numbers
12. Block data transfer
13. Multiplication of two 8 bit numbers
14. Division of two 8 bit numbers
15. Generating natural numbers
16. Masking and Setting of bits
17. Largest/Smallest of an array
18. Finding 1's and 2's Compliment

Year	Subject Title	Sem	Sub Code
2018-19 Onwards	Allied Physics Practical (Examination at the end of IV- Semester) (Any12)	IV	18BPH47P

Objective: To enhance the skill in handling simple measuring instruments and to learn physical concepts through experiments

1. Young's Modulus – Non-Uniform bending – Pin and microscope
2. Young's Modulus – Uniform bending – Optic lever
3. Rigidity modulus – Static Torsion method
4. Refractive Index of the Solid prism – Spectrometer
5. Refractive Index of the Liquid Prism – Spectrometer
6. Frequency a bar – Melde's String
7. AC frequency – Sonometer
8. Calibration of low range voltmeter – Potentiometer
9. Specific resistance – Potentiometer
10. Moment of magnet – Deflection magnetometer – Tan C Position
11. Acceleration due to gravity – Compound Pendulum
12. Surface Tension of the liquid – Drop weight method
13. Specific heat capacity of the liquid – Newton's law of Cooling
14. Verification of truth table – AND, OR, NOT logic gates
15. Characteristics of Junction diode
16. Thermal conductivity of a bad conductor – Lee's Disc method

