MAHENDRA ARTS & SCIENCE COLLEGE

(AUTONOMOUS)

(Affiliated to Periyar University)

[Accredited by NAAC "A" Grade & Recognized u/s 2(f) and 12(B) of the UGC act 1956]

KALIPPATTI-637501.

BACHELOR OF SCIENCE

SYLLABUS FOR B.Sc.PHYSICS

OUTCOME BASED EDUCATION - CHOICE BASED CREDIT SYSTEM

FOR THE STUDENTS ADMITTED FROM
THE ACADEMIC YEAR 2019 – 2020 ONWARDS

MAHENDRA ARTS & SCIENCE COLLEGE
(Autonomous)
(Affiliated to Periyar University)
Department of PHYSICS

B.Sc. PHYSICS

PREAMBLE

The PG & Research Department of Physics offers programs in conventional Physics to a broad range of students through creative and learning and teaching methodology which enables them to integrate this knowledge into their normal thought processes. Also, The department provides a forward-looking curriculum to undergraduate Physics majors, involving not only conventional Physics topics but also state-of-the-art instruction through Theory and Practical experimental techniques. On the other hand, computational and theoretical Physics with computers for data acquisition and analysis, as well as active involvement in professional research.

I - PROGRAMME EDUCATIONAL OBJECTIVES:

- **Technical Proficiency:** Obtaining successful employment to their respective interests, education and to become socially responsible physicist
- **Professional growth:** Developing life long learning, higher education and research in their respective areas of specialization
- **Management growth:** Improving leadership quality through innovative manner

II - PROGRAMME OUTCOMES:

- Ability to identify problem solving skills in the field of theoretical and experimental Physics
- Ability to engage in life-long learning and be able to demonstrate a knowledge of contemporary issues
- Ability to design a system, component to meet desired needs
- Ability to communicate scientific observations effectively in oral and written form

III - REGULATIONS

These regulations shall take effect from the academic year 2019-2020, i.e, for students who are to be admitted to the first year of the course during the academic year 2019-20 and thereafter.

1. **Objectives of the Course:**

   - To create socially responsible citizens with sound scientific background
   - To involve the students to familiar with various platforms of the Physics
   - To allow the students to enrich their knowledge toward research and development

2. **Eligibility for Admission:**

   Candidates seeking admission to first year of the Bachelor of Science – Physics Shall be required to have passed the Higher Secondary Examination with Mathematics, Physics and Chemistry or Electronics as one of the paper in vocational stream conducted by the Government of Tamil Nadu or an Examination accepted as equivalent thereto.

3. **Duration of the Course:**

   The candidates shall complete all the courses of the programme in 3 years from the date of admission. The programme of study shall consist of six semesters and a total period of three years with a minimum of 140 credits. The programme of study will comprise the course according to the syllabus.

4. **Course of Study:**

   The course of study for the UG degree has been divided into the following five categories:

   Part I : Tamil / Other Languages.
   Part II : English Language.
   Part III : Core Courses, Elective Courses and Allied Courses.
   Part IV : Skill Enhancement Courses, Non-Major Elective Course, Enhancement Compulsory Courses.
   Part V : Value added Courses and Extension Activity.

5. Examinations

The course of study shall be based on semester pattern with Internal Assessment under Choice Based Credit System.

The examinations for all the papers consist of both Internal (Continuous Internal Assessment - CIA) and External (End Semester) theory examinations. The theory examinations shall be conducted for three hours duration at the end of each semester. The candidates failing in any subjects(s) will be permitted to appear for the same in the subsequent semester examinations

6. Structure of the Programme:

SEMESTER: I

Part	Course Category	Title of the Course	Course Code	Hrs / Week		No. of Credits	Max. Mark		
				L	P		Int.	Ext.	Total
I	LANGUAGE COURSE – I	TAMIL - I		5	-	3	25	75	100
II	LANGUAGE COURSE - II	ENGLISH - I		5	-	3	25	75	100
III	CORE COURSE - I	PROPERTIES OF MATTER AND SOUND		6	-	5	25	75	100
III	ALLIED COURSE - I	ALLIED –I MATHEMATICS - I		6	-	4	25	75	100
III	CORE PRACTICAL-I	GENERAL PHYSICS EXPERIMENTS - I		-	3	3	40	60	100
III	ALLIED PRACTICAL- I	ALLIED PRACTICAL – I MATHEMATICS		-	3	-	-	-	-
IV	ECC-I	VALUE ADDED YOGA		2	-	2	25	75	100
	Total			**24**	**6**	**20**	**165**	**435**	**600**

SEMESTER: II

Part	Course Category	Title of the Course	Course Code	Hrs / Week		No. of Credits	Max. Mark		
				L	P		Int.	Ext.	Total
I	LANGUAGE COURSE - I	TAMIL - II		5	-	3	25	75	100
II	LANGUAGE COURSE - II	ENGLISH - II		5	-	3	25	75	100
III	CORE COURSE - II	MECHANICS		6	-	5	25	75	100
III	ALLIED COURSE - II	ALLIED –II MATHEMATICS - II		6	-	4	25	75	100
III	CORE PRACTICAL - II	GENERAL PHYSICS EXPERIMENTS - II		-	3	3	40	60	100
III	ALLIED PRACTICAL - I	ALLIED PRACTICAL – I MATHEMATICS		-	3	2	40	60	100
IV	ECC-II	ENVIRONMENTAL STUDIES		2	-	2	25	75	100
	Total			**24**	**6**	**22**	**205**	**495**	**700**

SEMESTER: III

Part	Course Category	Title of the Course	Course Code	Hrs / Week		No. of Credits	Max. Mark		
				L	P		Int.	Ext.	Total
I	LANGUAGE COURSE – I	TAMIL - III		5	-	3	25	75	100
II	LANGUAGE COURSE - II	ENGLISH - III		5	-	3	25	75	100
III	CORE COURSE -III	HEAT AND THERMODYNAMICS		5	-	5	25	75	100
III	ALLIED COURSE -III	ALLIED –III- CHEMISTRY - I		5	-	4	25	75	100
III	CORE PRACTICAL –III	GENERAL PHYSICS EXPERIMENTS - III		-	3	3	40	60	100
III	ALLIED PRACTICAL –II	ALLIED PRACTICAL – II CHEMISTRY		-	3	-	-	-	-
IV	SEC –I	SEC – I SOLAR ENERGY		2	-	2	25	75	100
IV	NMEC -I	NMEC - I		2	-	2	25	75	100
	Total			**24**	**6**	**22**	**190**	**510**	**700**

SEMESTER: IV

Part	Course Category	Title of the Course	Course Code	Hrs / Week		No. of Credits	Max. Mark		
				L	P		Int.	Ext.	Total
I	LANGUAGE COURSE –I	TAMIL - IV		5	-	3	25	75	100
II	LANGUAGE COURSE-II	ENGLISH - IV		5	-	3	25	75	100
III	CORE COURSE-IV	WAVE AND OPTIC S		5	-	5	25	75	100
III	ALLIED COURSE – IV	ALLIED –IV- CHEMISTRY - II		5	-	4	25	75	100
III	CORE PRACTICAL –IV	GENERAL PHYSICS EXPERIMENTS - IV		-	3	3	40	60	100
III	ALLIED PRACTICAL –II	ALLIED PRACTICAL – II CHEMISTRY		-	3	2	40	60	100
IV	SEC-II	SEC – II OPTICAL INSTRUMENTS		2	-	2	25	75	100
IV	NMEC-II	NMEC – II		2	-	2	25	75	100
V		EXTENSION ACTIVITY		-	-	1	-	-	-
	Total			**24**	**6**	**25**	**230**	**570**	**800**

SEMESTER: V

Part	Course Category	Title of the Course	Course Code	Hrs / Week		No. of Credits	Max. Mark		
				L	P		Int.	Ext.	Total
III	CORE COURSE –V	ATOMIC & MOLECULAR SPECTROSCOPY		5	-	5	25	75	100
III	CORE COURSE –VI	BASIC ELECTRONICS		5	-	5	25	75	100
III	CORE COURSE -VII	NUMERICAL METHODS		5	-	5	25	75	100
III	CORE COURSE -VIII	SOLID STATE PHYSICS		5	-	5	25	75	100
III	ELECTIVE COURSE -I	ELECTIVE –I		5	-	4	25	75	100
III	CORE PRACTICAL - V	GENERAL PHYSICS EXPERIMENTS - V		-	3	3	40	60	100
IV	SEC-III	SEC-III BIO PHYSICS		2	-	2	25	75	100
	Total			**27**	**3**	**29**	**190**	**510**	**700**

SEMESTER: VI

Part	Course Category	Title of the Course	Course Code	Hrs / Week		No. of Credits	Max. Mark		
				L	P		Int.	Ext.	Total
III	CORE COURSE – IX	ELCTRICITY AND MAGNITISM		6	-	5	25	75	100
III	CORE COURSE -X	NUCLEAR PHYSICS		6	-	5	25	75	100
III	CORE COURSE – X1	QUANTUM MECHANICS AND RELATIVITY		6	-	5	25	75	100
III	ELECTIVE COURSE- II	ELECTIVE –II		5	-	4	25	75	100
III	CORE PRACTICAL – VI	GENERAL PHYSICS EXPERIMENTS - VI		-	3	3	40	60	100
III	PROJECT COURSE	PROJECT – VIVA VOCE		2	-	2	40	60	100
IV	SEC-IV	SEC-IV- NON DESTRUCTIVE TESTING		2	-	2	25	75	100
ONLINE COURSE SWAYAM/MOOC									
	Total			**27**	**3**	**26**	**190**	**510**	**700**

Summary of Credits, Hours and Mark Distribution

Part	Course Name	No. of Credits						Total Credits	Total Hours	No. of Courses	Max. Marks
		I	II	III	IV	V	VI				
I	**Language – I**	3	3	3	3	-	-	12	20	4	400
II	**Language – II**	3	3	3	3	-	-	12	20	4	400
III	**Core**	5	5	5	5	20	15	55	55	10	1000
	Core Practical	3	3	3	3	3	3	18	18	6	600
	Elective	-	-	-	-	4	4	8	15	3	300
	Project	-	-	-	-	-	2	2	2	1	100
	Allied	4	4	4	4	-	-	16	22	4	400
	Allied Practical	-	2	-	2	-	-	4	12	2	200
IV	**SEC**	-	-	2	2	2	2	8	8	4	400
	NMEC	-	-	2	2	-	-	4	4	2	200
	Enhancement Compulsory Courses	2	2	-	-	-	-	4	4	2	200
V	**Extension Activities**	-	-	-	1	-	-	1	-	-	-
Total		**20**	**22**	**22**	**25**	**29**	**26**	**144**	**180**	**42**	**4200**

ALLIED SUBJECTS FOR B.Sc. Physics STUDENTS

Semester	Course Title	Course Code
I	ALLIED 1: MATHEMATICS - I	
II	ALLIED II: MATHEMATICS – II	
	ALLIED PRACTICAL – I: MATHEMATICS	
III	ALLIED III: CHEMISTRY - I	
IV	ALLIED IV: CHEMISTRY – II	
	ALLIED PRACTICAL – II: CHEMISTRY	

ALLIED SUBJECTS OFFERED FOR OTHER MAJOR STUDENTS

Semester	Course Title	Course Code
III	ALLIED 1: PHYSICS – I	
IV	ALLIED II: PHYSICS – II ALLIED PRACTICAL – I: PHYSICS	
III	ALLIED III: ADVANCED ELECTRONICS & ALLIED PRACTICAL: BASIC ELECTRONICS – I	
IV	ALLIED IV: APPLIED ELECTRONCS & ALLIED PRACTICAL: BASIC ELECTRONICS - II	

ELECTIVE SUBJECTS FOR B.Sc. Physics STUDENTS

Semester	**ELECTIVE – I**	
V	**Course Title**	**Course Code**
	Mathematical Physics	
	Radiation Physics	
	Applied Physics	
ELECTIVE – II		
VI	**Course Title**	**Course Code**
	Laser and Spectroscopy	
	Material Science	
	Physics in everyday life	

SKILL ENCHANCEMENT COURSES:

Semester	Course Title	Course Code
III	Solar Energy	
IV	Optical instruments	
V	Bio physics	
VI	Non Destructive Testing	

NON - MAJOR ELECTIVE COURSES:[FOR OTHER DEPARTMENTS]

Semester	Course Title	Course Code
III	Essential of Electricity	
IV	Basic of Electricity And Appliances	

IV SCHEME OF EXAMINATION:

1. Question Paper Pattern for Theory Papers

Time: Three Hours Maximum Marks: 75

Part A: (10 x 1 = 10)
Answer ALL Questions
(Objective Type - Two Questions from each unit)

Part B: (5 x 2 = 10)
Answer ALL Questions
(One Question from each unit)

Part C: (5 x 5 = 25)
Answer ALL Questions
(One Question from each unit with internal choice)

Part D: (3 x 10 = 30)
Answer Any Three out of Five Questions
(One Question from each unit)

2. Question Paper Pattern for Practical Papers

EXTERNAL MARK: 60
INTERNAL MARK: 40

3. Distribution of Marks:

The following are the distribution of marks for external and internal for End Semester Examinations and continuous internal assessment and passing minimum marks for Theory / Practical / Mini project / Project papers of UG programmes.

ESE	EA Total	Passing Minimum for EA	CIA Total	Passing Minimum for CIA	Total Marks Allotted	Passing Minimum (ESE)
Theory	75	30	25	10	100	40
Practical	60	24	40	16	100	40
Mini Project	--	--	100	40	100	40
Project	60	24	40	16	100	40

The following are the Distribution of marks for the Continuous Internal Assessment in Theory / Practical papers of UG programmes.

THEORY

EVALUATION OF INTERNAL ASSESSMENT

Test : 15 Marks
Assignment : 05 Marks
Attendance : 05 Marks

Total : 25 Marks

The Passing minimum shall be 40% out of 25 marks (10 marks)

PRACTICAL

EVALUATION OF INTERNAL ASSESSMENT

Test 1 : 15 Marks
Test 2 : 15 Marks
Record : 10 Marks

Total : 40 Marks

The Passing minimum shall be 40% out of 40 marks (16 marks)

PROJECT

EVALUATION OF INTERNAL ASSESSMENT

Review 1 : 10 Marks
Review 2 : 10 Marks
Review 3 : 10 Marks
Pre-Viva : 10 Marks

Total : 40 Marks

The Passing minimum shall be 40% out of 40 marks (16 marks)

4. Passing Minimum:

The Candidates shall be declared to have passed the examination if he/she secures not less than 40 marks in total (CIA mark + Theory Exam mark) with minimum of 30 marks in the End Semester Theory Examinations.

The Candidates shall be declared to have passed the examination if he/she secures not less than 40 marks in total (CIA mark + Practical Exam mark) with minimum of 24 marks in the End Semester Practical Examinations.

5. Submission of Record Note Books for Practical Examinations

Candidates appearing for practical examinations should submit a bonafide record note books prescribed for practical examinations. The candidates failed to submit the record book shall not be permitted to appear for the practical examinations

6. Project

The following guidelines to be followed for the Project with Viva-voce:

1. The project should be valued for 60 marks by an external examiner; however the Viva-Voce examination should be conducted by both the external examiner appointed by the College and the internal examiner / guide/teacher concerned.

2. The Project Report may consist a minimum of 60 pages.

3. The candidate has to submit the Project Report 20 days before the commencement of the VI Semester Examinations.

4. A candidate who fails in the Project/Dissertation or is absent may resubmit the report, on the same topic, with necessary modification / correction / improvements in the subsequent Even Semester Examinations for evaluation and shall undergo viva-voce Examination.

7. Note

SWAYAM / MOOC – Free Online Education

SWAYAM / MOOC is an instrument for self-actualisation providing opportunities for a life-long learning. Here the student can choose from hundreds of courses, virtually every course taught at the college level, offered by the best teachers in India and elsewhere.

The students can choose an online SWAYAM / MOOC course during their period of study which will earn an extra credit and it will be transferred to the academic records of the students.

SEMESTER I

Core – I	B.Sc. Physics	2019 - 2020
M19UPH01	PROPERTIES OF MATTER AND SOUND	
Credit: 5		

Objectives

Matters are classified into three types based on their atomic arrangements. The present title provides the basic knowledge about the three states of matter and will offer the properties.

Course outcomes

On the successful completion of the course, students will be able to

1. Understand the various types of matters based on their atomic arrangements
2. Know the physical properties involved to explore the nature of the materials
3. Familiar with the optimum conditions of the each matter
4. Study the properties in various atmospheric conditions

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	M	S	S	S
CO2	S	S	M	S
CO3	M	S	S	S
CO4	M	M	S	M

UNIT I :

Introduction: Hook's law – Elasticity and Plasticity - Elasticity : Three types of elastic moduli - Poisson's ratio - Bending of beams - Expression for bending moment - Depression of the loaded end of a Cantilever - uniform - theory - experiment pin and microscope method - work done in uniform bending - Koenig's method - non-uniform bending - theory - expression for couple per unit twist - determination of rigidity modulus - Static torsion method with scale and telescope - Rigidity modulus by torsion pendulum.

UNIT II :

Viscosity : Coefficient of critical velocity - Poiseulli's formula for coefficient of viscosity and its correction - determination of coefficient of viscosity by capillary flow method - comparison of viscosities Oswald's viscometer - viscosity of a highly viscous liquid - Stoke's method for the Coefficient of a highly viscous liquid - variations of viscosity with temperature and pressure - viscosity of gases - Mayer's formula for the rate of flow of a gas through a capillary tube -Rankine's method for the determination of viscosity of a gas.

UNIT III :

Surface tension and Osmosis : Surface energy - angle of contact and its determination - excess of pressure inside curved surface - formation of drops - Experimental study of variation of Surface tension with temperature - drop weight method of determining surface tension and interfacial surface tension - angle of contact of mercury - Quincke's method - surface tension and vapour pressure osmosis - experimental determination of osmotic pressure - Laws of osmosis pressure - osmotic and vapour pressure of a solution.

UNIT IV

Sound : Definition of free, damped and forced vibrations - Theory of forced vibrations - Resonance - Sharpness of resonance - Fourier's theorem - application for Saw- tooth wave and square wave.- Sonometer - determination of A.C. frequency using sonometer- Determination of frequency using Melde's apparatus.

UNIT V

Ultrasonics : Ultrasonics - Production - Piezo electric method - magneto-striction method - detection - properties - applications. Acoustics : Acoustics of buildings - reverberation time - derivation of Sabine's formula - determination of absorption coefficient.

TEXT BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Elements of Properties of matter	D.S. Mathur	S. Chand & Co	2005
2	Properties of matter	R. Murugasan	S. Chand & Co	2005
3	Properties of matter	Brijlal and N. Subramaniam	S. Chand & Co	2005

REFERENCE BOOKS:-

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Fundamentals of General Properties of Matter	H.R. Gulati	S. Chand & Co	2006
2	Properties of Matter	Subramania Iyar and Ranga Rajan	Vishwanathan Publications	2009
3	A Text book of sound	Shegal and Chopra	S. Chand & Co	2006

CO	Statement	Knowledge Level
CO1	Remember the concepts of atoms and their various arrangements	K1
CO2	Understand the various bonding formations among matters	K2
CO3	Analyze the nature of the bonds based on their physical properties	K3
CO4	Apply various physical laws depending upon their applications and properties	K4

SEMESTER II

Core – II	B.Sc.Physics	2019 - 2020
M19UPH02	MECHANICS	
Credit: 5		

Objectives

Mechanics are classified into two types statics and dynamics. The present course deals the nature of the systems in these two conditions and gives elaborate ideas about the mechanisms for various dimensional systems.

Course outcomes

On the successful completion of the course, students will be able to

1. Understand the concepts of statics and dynamics
2. Know the equations of motions to full fill the systems of the equations at various conditions
3. Familiar with the boundary conditions and constrains
4. Study the properties in various atmospheric conditions

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	S	S	S	S
CO2	S	M	M	S
CO3	M	S	M	S
CO4	M	M	S	M

UNIT I

Projectile: Definition of Range, time of flight and angle of projection - Range up and down an inclined plane maximum range - two directions of projections for a given velocity and range. Impulse-Impact: Laws of impact - coefficient of restitution - impact of a smooth sphere on a fixed smooth plane - Direct impact between two smooth spheres - Loss of kinetic energy in direct impact - velocity change in oblique impact between two smooth spheres.

UNIT II

SHM: Composition of two SHM's of same period along a straight line and at the right angles to each other Lissajous figures. Dynamics of Rigid Bodies: Compound pendulum theory condition -for minimum period interchangeability of center of suspension and center of oscillation – g using compound pendulum - Bifilar pendulum - parallel and non - parallel threads.

UNIT III

Center of gravity: Center of gravity of a solid cone, Solid hemisphere, hollow hemisphere and a tetrahedron. Friction: Laws of friction - angle of friction - resultant reaction and cone of fiction - equilibrium of a body on an inclined plane under the action of a force.

UNIT IV

Center of pressure: Definition - center of pressure of a rectangular lamina and triangular lamina. Hydrodynamics: equation of continuity of flow - Bernoullie's theorem - venturimeter - Pitot's tube.

UNIT V

Classical Mechanics: Mechanics of system of particles - conservation theorem for angular momentum and energy - constraints and its classification - generalized coordinates - transformation between generalized coordinate and physical coordinates - principle of virtual work - D' Alembert's principle - derivation of Lagrangian equation of motion from D' Alembert's principle - Atwood's machine.

TEXT BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Mechanics and Mathematical Methods	R. Murugasan	S. Chand & Co	2005
2	Dynamics	M.Narayanamoorthi	The national publishing company	2008
3	Statics, Hydrostatics and Hydrodynamics	M.Narayanamoorthi	The national publishing company	2009

REFERENCE BOOKS:-

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Classical Mechanics	Goldstein	John Willey Publishers	2004
2	Mechanics	D. Mathur	S. Chand & Co	2007

CO	Statement	Knowledge Level
CO1	Discuss the concepts of statics and dynamics	K1
CO2	Understand the equations of motions	K2
CO3	Analyze the uniform and non uniform structures under the conditions of equations of motions	K3
CO4	Apply various physical laws depending upon their applications and properties	K4

SEMESTER III

Core – III	B.Sc. Physics	2019 - 2020
M19UPH03	HEAT AND THERMODYNAMICS	
Credit: 5		

Objectives

Three laws of thermodynamics along with the properties of heat and its transfer will be dealt clearly in this title. The applications of heat energy with mechanics for day to day life are also involved in this course.

Course outcomes

On the successful completion of the course, students will be able to

1. Understand the concepts of thermodynamics laws
2. Having knowledge about the relation between volume, pressure and temperature
3. Familiar with the concepts of low temperature physics
4. Study the properties of the systems at various temperature levels with mechanics.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	M	S	M	M
CO2	S	S	M	S
CO3	S	S	S	S
CO4	S	M	M	M

Unit I

Zeroth first law of thermodynamics–Reversible and Irreversible process–Second law of thermodynamics– Carnot□s engine– derivation of efficiency– Carnots theorem – statement.Entropy–change of entropy inreversible and irreversible process–change of entropy inconversion of ice into steam.Third law of thermodynamics.

Unit II

Isothermal and adiabatic changes. Definition– Specific heat capacity(CvandCp)– derivation of equations for both Cv and Cp of gas–relationbetween Cp and Cv. Calorimetry – Joly's differential steam calorimeter for finding Cv– Callender and Barnescontinuous flow method to determine Cp.

UNIT III

Kinetic theory of gases–Mean free path–Transport phenomena–diffusion, viscosity and thermal conductivity. Maxwell's law of distribution of molecular velocities (noderivation) –expression for mean velocity, mean square velocity,mostprobable velocity–experimental verification by toothed wheel method. Degrees of freedom –Law of equipartition of energy –Liquefaction of gases–Liquefaction of air by Linde's method– properties of Helium I and HeliumII –Adiabatic demagnetization.

UnitI IV

Transmission of heat–thermal conductivity–thermal diffusivity. Rectilinear flow of heat –IngenHausz experiment– Lee's disc method of determination of thermalconductivityof badconductor. Radiation– Blackbody Radiation– Wien's law, Rayleigh-Jeanslaw and Planck'slaw (noderivation)–Stefan's law and its experimental verification

Unit V

Mole and Mass fraction, Dalton's and Amagat's Law. Properties of gas mixture – Molar mass, gas constant, density, change in internal energy, enthalpy, entropy and Gibbs function. Psychrometric properties, Psychrometric charts. Property calculations of air vapour mixtures by using chart and expressions. Psychrometric process – adiabatic saturation, sensible heating and cooling, humidification, dehumidification, evaporative cooling and adiabatic mixing.

TEXT BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Heat and Thermodynamics	Brijlal and N. Subramaniam	S. Chand & Co	1999
2	Thermal Physics	R. Murugasan	S. Chand & Co	2006

CO	Statement	Knowledge Level
CO1	Remember three laws of thermodynamics	K1
CO2	Understand various calorimetric techniques	K2
CO3	Analyze the relationship between volume. Pressure and temperature	K3
CO4	Apply various physical laws depending upon their applications and properties	K4

SEMESTER III

SEC – I	B.Sc. Physics	2019 - 2020
M19UPHS01	SOLAR ENERGY	
Credit: 2		

Objectives

This course elaborates the types of energy sources. Gives the brief ideas about renewable and non renewable sources. Also deals the types of solar cells, parameter and increasing the efficiency of the solar cells.

Course outcomes

On the successful completion of the course, students will be able to

1. The difference between renewable and non renewable energy sources
2. Semiconductors used for solar cells
3. Physical parameters involving in determining the properties of the solar cells
4. Fabrication of the solar cells

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	S	S	M	M
CO2	S	M	M	S
CO3	M	M	S	M
CO4	S	S	S	M

UNIT I

Basics of solar energy - Brief History of solar energy utilization - Various approaches of utilizing solar energy - Blackbody radiation- Relation between radiation field energy density and radiation spectrum - Planck's formula in energy unit - Maximum spectral density - Planck's formula in wavelength unit.

UNIT II

Basic parameters of the Sun - Measurement of the solar constant - The structure of the Sun - The origin of solar energy - Rotation and orbital motion of the Earth around the Sun - Solar time, sidereal time, universal standard time, local standard time - Equation of time - Intensity of sunlight on an arbitrary surface at any time - Interaction with the atmosphere .

UNIT III

Structure of a solar cell - The solar cell equation - Fill factor and maximum power - Crystalline silicon solar cells - Thin film solar cells: CIGS, Cite and a – silicon - Tandem solar cells - Dye - sensitized solar cells - Organic solar cells

UNIT IV

Three types of imaging optics: trough or linear collectors, central receiver with heliostats, and parabolic dish concentrator with on - axis tracking-Solar photovoltaic's with concentration. Solar records-solar pond-application of solar bonds- solar function- solar cooling-box type solar cooker-solar green house – types of green house.

UNIT V

Necessity of storage for solar energy- Chemical energy storage - Thermal energy storage - Thermal Flywheels - Compressed air- Rechargeable batteries.

TEXT BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Solar energy thermal process	Duffie, J.A. Beckman	John wiley and Sons	2007
2	The Sun	M. Stix	Imperial College press	2003
3	The Physics of Solar Cells	Nelson	Imperial College Press	2005
4	The Physics of Solar Cells	Nelson	Khanna Publishers	2010

CO	Statement	Knowledge Level
CO1	Identify the role of renewable and non renewable energy resources	K1
CO2	Discussing the types of solar cells	K2
CO3	Analyze the role of increasing the efficiency of the cell	K3
CO4	Incorporate new techniques for near future solar cells	K4

SEMESTER IV

CORE – IV	B.Sc. Physics	2019 - 2020
M19UPH04	WAVE AND OPTICS	
Credit: 5		

Objectives

The course titled wave and optics gives basic ideas about the properties of light and their behaviors in various conditions and medium. Optics deal the designing of lens based on their medium of refractive index and materials used.

Course outcomes

On the successful completion of the course, students will be able to

1. Familiar with the properties of light and types of lens
2. Understand the different types of aberrations
3. Having the basic ideas about the fabrication of lens
4. Introduce the technical knowledge about fiber optical communications

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	M	S	M	M
CO2	M	M	S	S
CO3	M	M	S	M
CO4	S	S	S	M

UNIT - I

Aberrations : Monochromatic aberrations - spherical aberration- methods of minimizing spherical aberration- Definition of coma,astigmatism and curvature of field, distortion - Method of minimizing spherical aberration ... - chromatic aberration - the achromatic doublet - removal of chromatic aberration of a separated doublet - Equivalent focal length of two thin lenses - in contact and out of contact method. Eye pieces : Huygen's and Ramsden eyepiece - location of cardinal points.Velocity of light - determination of velocity of light - Kerr cell method.

UNIT - II

Interference and Interferometers : Coherence - temporal coherence and spatial coherence - Air wedge - testing the planeness of a surface - Michelson Interferometer - types of fringes - Difference in wavelength of Sodium D1, D2 lines and thickness of a thin transparent plate. Multiple beam interference - Febry - Perot interferometer - formation of fringes. Holography : Holography - recording and reconstruction.

UNIT - III

Diffraction : Fresnel's and Fraunhoffer diffraction - Fresnel's half period zones - area of the half period zones - zone plate – Comparison of zone plate with convex lens - Phase revesal zone plate - Phase contrast microscope - Fraunhoffer diffraction pattern with N slits (diffraction grating) - normal incidence - absent and overlapping spectra of diffraction grating. Optical Instruments : Rayleigh's criterion - Resolving power of a telescope, microscope and grating.

UNIT IV

Polarization : Polarization - Nicol prism as polarizer and analyzer - Dichroic Polarizers - Huygen's theroy of double refraction in uniaxial crystals - Double image polarizing prisms - Quarter wave plate, Half wave plate - Babinet's compensator - Plane, elliptically and circularly polarized light - production and detection - Optical activity, analysis of light by Laurent's half shade polarimeter.

UNIT V

Fibre Optics : Introduction - fibre optic system - the fibre optic communication compared to metallic cable (electrical) communication - basic principle - total internal reflection - acceptance angle and numerical aperture - types of optical fibres based on material - propagation (transmission) of light through an optical fibre - index profile - fibre configurations - difference between singlemode fibre and multimode fibre - difference between step index fibre and graded index fibre - fibre optic communication link.

TEXT BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1	A text book of optics	N. Subramaniyam and Brijlal	S. Chand & Co	2004
2	Optics and Spectroscopy	R. Murugasan	S. Chand & Co	2006
3	Geometrical and Physical Optics	P. K. Chakrabarti	New Central Book Agency	2005
4	Optics	D. R. Khanna & H. R. Gulati	S. Chand & Co	2005

REFERENCE BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Optics	Eugene Hecht	Person Education	2007
2	Fundamentals of Optics	Jerkins A francis	McGraw Hill	1976
3	Optical Physics	S. G. Lipson	Cambridge University Press	1995

CO	Statement	Knowledge Level
CO1	Remember the laws of reflection and refraction	K1
CO2	Identify the properties of light through lens	K2
CO3	Elaborate the types of prisms and gratings	K3
CO4	Incorporate new techniques for near future Lens	K4

SEMESTER IV

SEC – II	B.Sc. Physics	2019 - 2020
M19UPHS02	OPTICAL INSTRUMENTATION	
Credit: 2		

Objectives

The course titled optical instrumentation will be the continuation of previous course. Optics and instrumentations based on their fabrications deal the designing of lens based on their medium of refractive index and materials used.

Course outcomes

On the successful completion of the course, students will be able to

1. Familiar with the properties of Optical properties
2. Know the applications of optics in day to day life
3. Having the basic ideas about structures of human eye with others
4. Understand technical knowledge about optical instrumentations

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	M	S	M	M
CO2	M	M	S	S
CO3	M	M	S	M
CO4	S	S	S	M

UNIT I

Eye: Human eye Human structure and properties - Schematic eye - Human eye inspired optics -Animal eye 1.2. Animal eye structure and human eye structre.

UNIT II

Phase contrast microscope - Principle –Applications-Differential interference contrast microscope -Principle - Applications -Polarization microscope –Principle- Polarization imaging systems.

UNIT III

Telescopes : Introduction -principal -types -Refracting telescopes - Reflecting telescopes- Configurations-Field correctors Focal reducer/extenders -Aperture obscuration- Design considerations-Tilted-component telescopes –Configurations-Three-mirror Anastigmats -Large telescopes.

UNIT IV

Display technology : Introduction – types -Projection -displays -Principle - Light valves – Configurations- Illumination systems - DMD projection display -LCD projection display - LCoS projection display- Pico projector - Flat panel displays -Optical films -Light guide plate- Digital cinema -3D display - 3D display with viewing aids -Autostereoscopic displays.

UNIT V

Interferometry – Types – low Coherence -Optical coherence tomography- Principle - Time-domain OCT -Optical delay lines -Scanning optics - Fourier-domain OCT (FD-OCT) - Spectral-domain OCT (SD-OCT) -Swept source OCT (SS-OCT).

TEXT BOOKS

S.No	Title of the Book	Author	Publisher	Year of Publication
1	A text book of optics	N. Subramaniyam and Brijlal	S. Chand & Co	2004
2	Optics and Spectroscopy	R. Murugasan	S. Chand & Co	2006
3	Geometrical and Physical Optics	P. K. Chakrabarti	New Central Book Agency	2005
4	Optics	D. R. Khanna & H. R. Gulati	S. Chand & Co	2005

CO	Statement	Knowledge Level
CO1	Remember the laws of reflection and refraction	K1
CO2	Identify the properties of light through lens	K2
CO3	Elaborate the types of prisms and gratings	K3
CO4	Incorporate new techniques for near future Lens	K4

SEMESTER V

CORE – V	B.Sc.Physics	2019 - 2020
M19UPH05	ATOMIC AND MOLECULAR SPECTROSCOPY	
Credit: 5		

Objectives

All the matters are composed of atoms and molecules. The structure of the atoms and molecules will give a basic ideas about the structures of the chemical compounds. This present course gives a brief ideas about atoms with the help of spectroscopy.

Course outcomes

On the successful completion of the course, students will be able to

1. Understand the structure of the atoms
2. Familiar with the theories of atoms and molecules
3. Know the interaction of energy with matter
4. Understand the relationship between energy and matter during interaction

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	M	S	M	M
CO2	M	M	S	S
CO3	M	M	S	M
CO4	S	S	S	M

Unit I

Introduction to Spectroscopy and types of Spectra, Spectrum of Hydrogen Atom, Bohr Model for hydrogen atom, Bohr-Sommerfeld model of Hydrogen Atom, Sommerfeld's Relativistic Correction for energy levels of hydrogen atom, Fine Structure of Hydrogen Atom.

Unit II

Magnetic Dipole Moments, Electron Spin and Vector Atom Model and Sterrn-Gerlach Experiment, , Zeeman Effect, Paschen-Back effect, Stark Effect, Spin-orbit interaction for two valance electron system (LS and JJ Coupling), Pauli's exclusion Principle, Singlet and Triplet States, Selection Rules, Hyperfine Structure of Spectral Lines and isotopic shift, Spectrum of helium and alkali atom

Unit III

Breadth of Spectral Lines, Effect of Nuclear Properties on Spectral Lines, X-ray Spectra, Moseley's Law, Regular and Irregular Doublet Law, Photoelectron Spectra.

Unit IV

Frank-Condon principle Born-Oppenheimer approximation Electronic, rotational, vibrational and Raman spectra of diatomic molecules, selection rules

Unit V

Nuclear Magnetic Resonance (NMR), and Electron Spin Resonance (ESR). Lasers: spontaneous and stimulated emission, Einstein A & B coefficients. Optical pumping, population inversion, rate equation. Modes of resonators and coherence length.

TEXT BOOKS

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Molecular Structure and spectroscopy	G. Aruldhas	Prentice Hall of India	2007
2	Fundamentals of Molecular Spectroscopy	C. N. Banwell	Mc Graw Hill	1972
3	Molecular Physics	W. Demtroder	Willey VCH	2005

CO	Statement	Knowledge Level
CO1	Remember about atoms and molecules	K1
CO2	Understand the structures of atoms through various models	K2
CO3	Analyze the interaction of energy with matter	K3
CO4	Apply spectroscopy to solve the structure of the molecules	K4

SEMESTER V

CORE – VI	B.Sc. Physics	2019 - 2020
M19UPH06	BASIC ELECTRONICS	
Credit: 5		

Objectives

Semiconducting materials play a major role in day to day applications. These semiconducting materials classified based on their transport of the electrons. This course gives basic ideas of the transports of electrons through physical laws.

Course outcomes

On the successful completion of the course, students will be able to

1. Identify the role of electrons in semiconductors
2. Familiar with Ohms and Kirchof's laws
3. Know the Positive and negative temperature coefficients
4. Understand the transport of electrons in transistors, rectifiers and amplifiers

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	M	S	M	M
CO2	M	M	S	S
CO3	M	M	S	M
CO4	S	S	S	M

UNIT I

Special diodes : Light Emitting Diode (LED) and its advantages - multicolor LEDs and its applications - Photo diode - characteristics and applications - Tunnel diode and its characteristics - Tunnel diode as an Oscillator - Varactor diode - Theory and its applications - Shockley diode - PIN diode and its applications.

UNIT - II

Hybrid (h) parameters - determination of h-parameters - h-parameters equivalent circuit - performance of a linear circuit in h-parameter - the h-parameter of a transistor - Nomenclature for transistor h-parameters - input impedance, voltage gain and current gain in h-parameters - experimental determination of h-parameters - limitations of h-parameters.

UNIT - III

Common emitter transistor as an amplifier - DC and AC load line analysis - Transistor biasing - stabilization - base resistor method - feed back resistor method - Voltage divider bias method - Construction of JFET - its characteristics and parameters - Common source JFET amplifier- MOSFET- Depletion MOSFET- Enhancement MOSFET - UJT, SCR - Construction, working, V-I characteristics and their application.

UNIT - IV

Multistage amplifier - definition of gain, frequency response, decibal gain and bandwidth - operation, frequency response, advantage, disadvantage and applications of RC coupled CE transistor amplifier (two stage) and transformer coupled amplifier. Principle of feedback in amplifiers-positive and negative feedback-effect of negative feedback - emitter follower - positive feedback amplifier as an oscillator - Hartley oscillator, Wien-bridge oscillator and Piezo electric crystal oscillator.

UNIT - V

Multivibrators - astable, monostable and bistable multivibrator using transistor.Operational Amplifier : Differential amplifier - basic circuit and its operation -CMRR - Op-amp - Block diaram and explanation - applications - differentiator , integrator and comparator - multistage op-amp - solving simultaneous equations.

TEXT BOOKS

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Basic Electronics	B. L. Theraja	S. Chand & Co	2000
2	Principles of Electronics	V. K. Metha	S. Chand & Co	2001

REFERENCE BOOKS

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Foundation of electronics	D. Chattopadhyay	New Age International	1999
2	Hand book of electronics	Gupta & Kumar	Pragati Prakhasan	2005

CO	Statement	Knowledge Level
CO1	Remember Kirchof's and Ohm's law	K1
CO2	Elaborate the types of semiconductors	K2
CO3	Give the knowledge about transistors and rectifiers	K3
CO4	Discuss the functions of amplifiers	K4

SEMESTER V

CORE – VII	B.Sc. Physics	2019 - 2020
M19UPH07	NUMERICAL METHODS	
Credit: 5		

Objectives

Numerical methods play a major role in day to day applications in order to understand the physics through programs and mathematical interpretations.

Course outcomes

On the successful completion of the course, students will be able to

5. Identify the role of Mathematical functions for Physics
6. Familiar with Matrices and prgrams
7. Know the different curve fitting methods
8. Understand the Numerical integration methods

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	M	S	M	M
CO2	S	M	S	M
CO3	S	S	M	S
CO4	M	S	S	S

UNIT I : MATRICES

Solution of linear equation - Cramer's rule - characteristics matrix and characteristics equation of a matrix - eigen values and eigen vectors - sub space and null space Diagonalisation of 3 x 3 symmetric matrices.

UNIT II : BETA AND GAMMA FUNCTIONS

Fundamental properties of gamma functions - the value and graph of gamma function - transformation of gamma function - different forms of beta function - relation between beta and gamma function - application.

UNIT III : CURVE FITTING

Principle of least square - fitting a straight line - linear regression - fitting a parabola - fitting an exponential curve.

UNIT IV : ITERATIVE METHODS

Solving non - linear equation - bisection method - Successive approximation - Newton Rapson method - modified Euler's method - Runge - Kutta method (second and third orders only)

UNIT V : NUMERICAL INTEGRATION

General formula - Trapezoidal rule - Simpson's -1/3 rd rule and 3/8th rule - Gaussian quadrature formula.

TEXT BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Introductory methods of numerical analysis	S.S. Sastry	Prentice Hall of India, New Delhi	2000
2	Numerical methods	A. Singaravelu	Meenakshi Agency, Chennai	2001

REFERENCE BOOKS:-

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Numerical method in Science and Engineering	M.K. Venkataraman	PHI – New Delhi	1997
2	Mechanics and Mathematical methods	R. Murugesan	S. Chand & Co, New Delhi	1999

SEMESTER V

CORE – VIII	B.Sc. Physics	2019 - 2020
M19UPH08	SOLID STATE PHYSICS	
Credit: 5		

Objectives

The students will be familiarized with the basic concepts of crystals and their respective lattice arrangements. In addition with the above the students are able to understand the physical properties such as dielectric, magnetic, electric, etc., through this course.

Course outcomes

On the successful completion of the course, students will be able to

1. Understand the three states of matter
2. Enhance the crystallographic nature of the systems
3. Know the physical properties involved in the systems
4. Explain the modern engineering materials through the above said properties

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	S	M	M	M
CO2	M	M	S	S
CO3	M	S	S	M
CO4	M	M	S	S

UNIT I :

Crystal lattice - primitive and unit cell - crystal systems - Bravais lattice - Miller indices - Structure of Crystal - Simple Cubic, Body Centered Cubic, Face Centered Cubic and Hexagonal Close Packed structure, Sodium chloride structure, Zinc blende structure and Diamond structure.

UNIT II :

X ray Spectrum - Moseley's law - diffraction of X-rays by crystals - Bragg's law in one dimension - Experimental method in X-ray diffraction - Laue's method, rotating crystal method - powder photograph method - point defects - line, surface and volume defects - effects of crystal imperfections.

UNIT III :

Different types of magnetic materials (dia- , para- , ferro - and anti-ferro) - Langevin's theory of diamagnetism - Langevin's theory of paramagnetism - Weiss theory of paramagnetism - quantum theory of ferromagnetism - ferrites - general properties of superconductors - type I & type II superconductors.

UNIT IV :

Fundamental definition in dielectrics- different types of electric polarization- frequency and temperature effects on polarization- dielectric loss- Claussius- Mosotti relation- determination of dielectric constant - dielectric breakdown - properties of different types of insulating materials.

UNIT - V:

Polymers- ceramics- super strong materials- cermets- high temperature materials - thermoelectric materials - electrets - nuclear engineering materials - plastics - metallic glasses - optical materials - fiber optic materials & uses.

TEXT BOOKS

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Introduction to Solid State Physics	C. Kittel	John Wiley	2004
2	Material Science	M. Arumugam	Anuradha Agencies	2004
3	Engineering Physics	G. Vijayakumari	Vikas Publications	2002

REFERENCE BOOKS

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Materials Science and Engineering	Raghavan	Anuradha Agencies	2004
2	Introduction to Solids	Azaroff	John Wiley	2004
3	Solid State Physics	A.J. Deckker	John Wiley	2004

CO	Statement	Knowledge Level
CO1	Identify the differences between three states of matter	K1
CO2	Understand the Crystallographic concepts to know the structure of the materials	K2
CO3	Analyze the dielectric behavior of the materials	K3
CO4	Apply the properties in order to understand the modern engineering materials	K4

SEMESTER V

ELECTIVE – I	B.Sc. Physics	2019 - 2020
M19UPHE01	MATHEMATICAL PHYSICS	
Credit: 4		

Objectives

Mathematical Physics deals the applications of various mathematical theories to understand the physical mechanisms with the help of the equations derived by various methods.

Course outcomes

On the successful completion of the course, students will be able to

1. Apply various suitable equations to explore physical phenomenon
2. Analyze the matrices for quantum mechanical treatment
3. Know the suitable derivatives for fluid mechanics such as differential equations
4. Understand the intgegrals, matrices, etc., to solve the puzzles of Physics

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	S	S	M	M
CO2	M	S	M	S
CO3	S	S	M	S
CO4	M	M	S	M

Unit I

Concept of Vector and Scalar fields – Gradient, divergence, curl Linear dependence of vectors – inner product space, Gauss theorem, Stokes theorem- Greens theorem and Proof - Euler's Equation.

Unit II

Fourier series for periodic function – Half range series. Fourier integral theorem – Fourier cosine and sine integrals

Unit III

Solution of linear Algebraic equation – Rank of a matrix – Characteristic equation of matrix – Eigen values and eigen vectors, Caley Hamilton Theorem – Theorem on Eigen Values and Eigen Vectors, Diagonalization of Matrix, Problems. Functions of complex variable – Differentiability – Cauchy – Riemann conditions – complex integration – Cauchy's integral theorem and integral formula.

Unit IV

Linear ordinary differential equation – Elementary methods – Linear second order differential equations with constant and variable coefficients. Methods of forming partial differential equations – solution by direct integration method of separation of variables.

Unit V

Definitions of beta and gamma function – symmetry property of beta function – evaluation of beta function – other forms of beta function – simple problems. Evaluation of gamma function – value of gamma ½ – other forms of gamma function – Relation between beta and gamma function – simple problems.

TEXT BOOKS

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Mathematical Physics	B.D. Gupta	Vikas Publications	2010
2	Mathematical Physics	Sathyaprakash	S. Chand & Co	2014
3	Mathematical Physics	A. W. Joshi	New Age International	2009

REFERENCE BOOKS

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Elements of Group theory for Physicists	A. W. Joshi	New Age International Publications	2000
2	Applied Mathematics for Engineering and Physicist	L. A. Pipes	Mc. Graw Hill	1967

CO	Statement	Knowledge Level
CO1	Remember the basics of vectors and scalars	K1
CO2	Discuss the applications of series theorems for various physical systems	K2
CO3	Elaborate the ideas of differential equations for dynamics	K3
CO4	Discuss the applications of mathematics as a tool for various systems in day to day life	K4

SEMESTER V

ELECTIVE – I	B.Sc. Physics	2019 - 2020
M19UPHE02	RADIATION PHYSICS	
Credit: 4		

Objectives

The course with the title "Radiation Physics" completely gives the basic ideas about structure of matter and nuclear transformation in order to know their suitability for various applications. Also it deals the radiation generators.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	S	S	M	S
CO2	M	M	S	S
CO3	S	S	S	S
CO4	M	S	M	S

UNIT I - STRUCTURE OF MATTER, NUCLEAR TRANSFORMATION AND XRAYS

Elementary particles - Electromagnetic radiation-wave model and quantum model. Nuclear Transformation - Nuclear transformation-radioactivity - Decay constant – Activity - Radioactive series - Radioactive equilibrium -Activation of nuclides.X-RaysProduction of X-rays - X-ray tube - X-ray circuit - voltage rectification - Physics of Xray production - X-ray energy spectra - Operating characteristics.

Unit II

Clinical Radiation Generators Kilo-voltage units- Grenz-ray therapy - Contact therapy - Superficial therapy - Orthovoltage therapy or deep therapy - Super voltage therapy - Resonant transformer units - Megavoltage therapy - Van de graff generator - Linear accelerator - Betatron - Cyclotron - Microtron - Machines using radionuclides-Cobalt-60 unit - Heavy particle beams.

Unit III

Ionizing Radiation, Quality of X-Ray Beams, Measurement of Absorbed Dose Ionizing Radiation - Interaction of ionizing radiation-Ionization - Photon beam description - Photon beam attenuation - Attenuation

coefficient - Energy transfer - energy absorption coefficient - Interaction of photons with matter - Coherent scattering - The Roentgen - Free air ionization chamber - String electrometer - Ion collectionSaturation and collection efficiency - Measurement of exposure.

Unit IV

Classical Radiation Therapy Dose distribution and scatter analysis-Phantoms - Depth dose distribution - percentage depth dose-Dependence on beam quality and depth - Tissue air ratio (TAR)-relationship between TAR and percent depth dose- Dose calculation parameters- Collimator Scatter Factor - Phantom Scatter Factor - Tissue-Phantom and Tissue-Maximum Ratios - ScatterMaximum Ratio- Practical Applications - Accelerator Calculations- SSD Technique - Cobalt 60 Calculations.

Unit V

Modern Radiation Therapy, Dosimetry and Radiation Protection - Radiation Therapy-Image-Guided Radiation Therapy - Proton Beam Therapy. Dosimetry-Dosimeter - Film badge dosimeter - Pocket dosimeter. Radiation ProtectionRadiation Protection - Dose Equivalent - Effective Dose Equivalent - Background Radiation - Low-Level Radiation Effects - Effective Dose-Equivalent LimitsOccupational and Public Dose Limits.

TEXT BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Fundamental Physics of Radiology	Meredith W.J. and J.B. Massey	A. John Wright and Sons Ltd	1983
2	Radiation Therapy Physics	William.R.Hendee, Geoffery.S.Ibbott and Eric.G.Hendee	A.John Wiley and Sons.,Inc	2005

REFERENCE BOOKS:-

S.No	Title of the Book	Author	Publisher	Year of Publication
1	A Primer in Applied Radiation Physics	Smith F.A	World scientific publishing Co	2000
2	Radiation Physics for Medical Physicists	Podgarsak E.B	Springer	2006

CO	Statement	Knowledge Level
CO1	Remember the laws for the production of radiation	K1
CO2	Identify suitable testing methods for radiation techniques	K2
CO3	Inspect suitable radiation generators	K3
CO4	Apply and Extend radiation Physics for clinical and other applications	K4

SEMESTER V

ELECTIVE – I	B.Sc. Physics	2019 - 2020
M19UPHE03	APPLIED PHYSICS	
Credit: 4		

Objectives

The Present course deals about the applications of Physics in various aspects such as crystal growth, vacuum technology, nanomaterials etc.,

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	S	S	S	S
CO2	S	M	S	M
CO3	M	M	M	M
CO4	M	S	M	S

UNIT I : Crystal Growth

Nucleation concept – kinds of nucleation – equilibrium - stability and meta stable state– energy formation of a nucleus – various crystal growth methods – growth of crystals from solutions – preparation of a solution– saturation and super saturation – low temperature solution growth.

UNIT II : Nanomaterials

Synthesis and classification of synthesis methods –techniques used in synthesis of nano materials – Chemical vapour Deposition, Sol-gel technique, Electro Deposition method, Ball Milling method – Properties of nano materials and applications

UNIT III : Vacuum Technology

Vacuum - Importance of Vacuum technology in Industry – unit of vacuum – pressure range for low vacuum to ultra-high vacuum Pumps: Cenco-havoc rotating oil pump, Mercury diffusion pump and Turbo molecular pump. Gauges: Pirani gauge, Penning gauge and Mc Lead gauge

UNIT IV : Spectroscopy

Resonance Spectroscopy Techniques : Principle of NMR spectroscopy – spectrometer and simple applications; Principle of ESR spectroscopy – spectrometer and simple applications; Principle of Moss Bauer spectroscopy – spectrometer and simple applications.

UNIT V : Bio Physics

Basis of bio molecules and molecular system-Membrane biophysics - nerve cell - bio physical basis of nerve impulse conduction – membrane potential – resting potential and action potential - Gross bioelectrical phenomenon of ECG and EEG-Molecular basis of muscle contraction, ultra structure and molecular basis of vision and hearing

TEXT BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Introduction to Nanotechnology	Charles P. Poole Jr, Frank J.Owens	Wiley , India	
2	NANO: The Essentials	T. Pradeep	McGraw-Hill Education	
3	Biophysics	M. V. Volkenshtein	Mir Publications	

REFERENCE BOOKS:-

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Engineering Physics	G. Vijayakumari	Vikas publications	
2	Crystal Growth: Process and Methods	Dr. P. Ramaswamy and P.Santhana Ragavan	Kuru Publications, Kumbakonam.	
3	Essentials of Bio-Physics	Narayanan.P	New Age Publications	

CO	Statement	Knowledge Level
CO1	Remember the concepts of crystal growth	K1
CO2	Identify the role of Physics in nanomaterials	K2
CO3	Inspect the concepts of Physics in vacuum technology	K3
CO4	Apply and Extend Physics for clinical and other applications	K4

SEMESTER V

SEC – III	B.Sc. Physics	2019 - 2020
M19UPHS03	BIO PHYSICS	
Credit: 2		

Objectives

This course presents the applications of various Physical Laws towards biological applications.

Course outcomes

On the successful completion of the course, students will be able to

1. Apply Physics laws for biological applications
2. Understand the Mechanism of organs and their relation with Physical parameters
3. Know the techniques available to explore the nature of the bio systems
4. Familiar with diagnosis techniques.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	S	S	M	M
CO2	M	S	M	S
CO3	S	S	M	S
CO4	M	M	S	M

Unit I

Scope of Biophysics -Fundamentals of Biophysics– Surface tension – Adsorption – Osmosis –Osmotic pressure – Dialysis – Colloids – Colloidal systems of life – Buffer – Buffer capacity – Buffers in life system – pH, its importance.

Unit II

Biomembranes Membrane structure – composition, function, membrane transport – simple diffusion – passive transport and active transport (all types).

Unit III

Transuducing Membranes Mitochondrial Membrane, chloroplast membrane, chemical potential, redox potential, mitochondrial electro transport and photosynthetic electron transport.

Unit IV

Techniques in Biophysics (Preliminary), 26 Basics of spectroscopy – X-ray crystallography – NMR – UV.

Unit V

Laser applications in biomedical field, radiotherapy and telemedicine

CO	Statement	Knowledge Level
CO1	Remember basic Physics laws such as surface tension, osmosis etc.,	K1
CO2	Understand the mechanism of membrane structure	K2
CO3	Analyze various types of membranes	K3
CO4	Apply the techniques in Bio Physics	K4

SEMESTER VI

CORE – IX	B.Sc. Physics	2019 - 2020
M19UPH09	ELECTRICITY AND MAGNETISM	
Credit: 5		

Objectives

This course provides the basic understanding the relation between electricity and magnetism. The relation between the electricity and magnetism will be highly helpful to unleash the puzzles of Physical laws in the universe.

Course outcomes

On the successful completion of the course, students will be able to

1. Understand the relation between electricity and magnetism through Maxwell's equations.
2. Familiar with the applications of capacitors
3. Know the techniques available to explore thermoelectric materials
4. Explore the knowledge in various types of current flows

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	S	S	M	M
CO2	M	S	M	S
CO3	S	S	M	S
CO4	M	M	S	M

UNIT I

Principle of a capacitor - energy stored in a capacitor - energy density - change in energy due to dielectric slab - force of attraction between plates of a charged capacitor - capacitance of a spherical and cylindrical capacitors - types of capacitors - electrometers - Kelvin's attracted disc electrometer - quadrant electrometer - measurement of potential, ionization current and dielectric constant (solid).

UNIT II

Carey-Foster Bridge - theory - temperature coefficient of resistance - potentiometer- measurement of current, voltage and resistance - thermoelectricity- laws of thermo e.m.f, intermediate metals,

intermediate temperature - S. G. Starling method for Peltier effect and Thomson effect - Thermodynamics of thermocouple - determination of π and σ - thermoelectric diagrams and its uses.

UNIT III

Magnetic induction due to a straight conductor carrying current - magnetic induction on the axis of a solenoid - moving coil ballistic galvanometer- damping correction - determination of absolute capacity of a condenser- self- inductance by Anderson's Bridge method- experimental determination of mutual inductance - coefficient of coupling - concept of displacement current - Maxwell's electromagnetic equations in differential and integral form (no derivation).

UNIT IV

Transient current - growth and decay of current in a circuit containing resistance and inductance - growth and decay of charge in a circuit containing resistance and capacitance - measurement of high resistance by leakage - growth and decay of charge in a LCR circuit - condition for the discharge to be oscillatory - frequency of oscillation - Importance in wireless telegraphy.

UNIT V

Alternating current - peak, average and RMS value of current and voltage - form factor - j operator - ac circuit containing resistance and inductance - choke coil - ac circuit containing resistance and capacitance - series and parallel resonance circuits - Q factor - power in an ac circuit containing LCR - Wattless current - Transformer - construction, theory and uses - energy loss - skin effect - Tesla coil.

TEXT BOOKS

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Electricity and Magnetism	Brijlal and Subramaniam	S. Chand & Co	2009
2	Electricity and Magnetism	R. Murugasan	S. Chand & Co	2005

REFERENCE BOOKS

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Electricity and Magnetism	Vasudeva	S. Chand & Co	2005
2	Electricity and Magnetism	K. K. Tewari	S. Chand & Co	2005

CO	Statement	Knowledge Level
CO1	Remember the magnetic and electric fields and their relations	K1
CO2	Understand the mechanism of capacitors	K2
CO3	Difference between various current flows and their applications	K3
CO4	Enrich the applications of Electromagnetic theory in day to day life	K4

SEMESTER VI

CORE – X	B.Sc. Physics	2019 - 2020
M19UPH10	NUCLEAR PHYSICS	
Credit: 5		

Objectives

This course presents the rich knowledge about the structures of the nucleus and the theories that supports to understand the nature of the nucleus present inside the atoms

Course outcomes

On the successful completion of the course, students will be able to

1. Understand the structure of the nucleus
2. Familiar with the models that supports for nucleus
3. Know the techniques available to determine the force of the nucleus
4. Explore the knowledge in nuclear reactors

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	S	S	M	M
CO2	M	S	M	S
CO3	S	S	M	S
CO4	M	M	S	M

UNIT - I :

Laws of successive disintegration - transient - and secular equilibria- range of alpha particles - experimental measurement - Geiger-Nuttal Law - alpha ray spectra - Gamow's theory of alpha decay and its experimental verification - Beta ray spectra - origin of line and continuous spectrum - Fermi's theory of beta decay - K electron capture - Nuclear Isomerism.

UNIT - II :

Principle and working - solid state detector - proportional counter - Wilson's cloud chamber - Scintillation counter. Accelerators : Synchrocyclotron - Synchrotron - Electron synchrotron -proton synchrotron - Betatron.

UNIT - III :

Rutherford's experiment - Bohr's theory of Nuclear disintegration -Q value equation for a nuclear reaction - threshold energy - types of nuclear reaction - energy balance and the Q value - threshold energy of an endoergic reaction. Neutron: Mass, charge, decay, spin and magnetic moment, Neutron diffration, absorption of neutron by matter - neutron sources - detectors - neutron collimator.

UNIT - IV :

General properties of nucleus - size , mass and charge. Proton - electron theory - proton - neutron theory - Nuclear size - experimental measurement of nuclear radius - mirror nuclei method- meson theory of nuclear forces - nuclear models - liquid drop model - Weizacker's semi - empirical formula - nuclear shell model.

UNIT - V :

Nuclear fission - Bohr Wheeler theory - chain reaction - critical size and critical mass - Nuclear fission reactor - Nuclear fusion – source of stellar energy - Carbon - Nitrogen cycle - Proton - Proton cycle - Thermo Nuclear reaction - plasma. Elementary Particles- types of interactions- classification of elementary particles - particle quantum numbers - baryon number -lepton number- strangeness number - hyper charge - isospin quantum number.

TEXT BOOKS

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Modern Physics	R. Murugasan	S. Chand & Co	2005
2	Atomic Physics	J. B. Rajam	S. Chand & Co	2005
3	Nuclear Physics	D. C. Thayal	Himalya Publications	1999

REFERENCE BOOKS

S.No	Title of the Book	Author	Publisher	Year of Publication
1	A source book of atomic energy	Samual Glass Stone	S. Chand & Co	2005

CO	Statement	Knowledge Level
CO1	Recall the constituents of the atoms	K1
CO2	Understand the four types of forces in the universe	K2
CO3	Analyze the various theoretical models to predict the structure of the nucleus	K3
CO4	Enrich the role of neutrons in reactors	K4

SEMESTER VI

CORE – XI	B.Sc. Physics	2019 - 2020
M19UPH11	QUANTUM MECHANICS AND RELATIVITY	
Credit: 5		

Objectives

This course will be extension of previous semester (Quantum Mechanics – I). It also covers the wave nature of matter and applications of wave mechanics in multi dimension along with the introduction of relativity.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	M	S	S	S
CO2	S	M	M	M
CO3	M	S	M	M
CO4	M	M	S	M

UNIT I :

Inadequacy of classical mechanics - matter waves - Phase and group velocity - wave packet - Heisenberg's uncertainity principle - its consequences (free electron cannot reside inside the nucleus and gamma ray microscope) - expressions for de-Broglie wavelength -Davisson and Germer's experiment - G.P. Thomson experiment.

UNIT II :

Basic postulates of wave mechanics - Schrodinger's equation - properties of wave function - operator formalism - linear operators- self-adjoint operators - expectation values (position and momentum)- eigen value and eigen function - commutativity and compatibility.

UNIT III :

Application Of Wave Mechanics In One Dimension Particle in a box of length L - Barrier penetration problem - Linear harmonic oscillator.

UNIT IV:

Orbital angular momentum (L) - operators and their commutation relations - separation of three dimensional Schroedinger's equation into radial and angular parts - rigid rotator - Hydrogen atom.

UNIT V :

Frame of reference - Gallilean transformation - Michelson & Morley experiment - postulates of special theory of relativity - Lorentz transformation - length contraction - time dilation - relativity of simultaneity - addition of velocities - variation of mass with velocity - mass - energy relation - Minkowski's four dimensional space - time continuum - four vectors - elementary ideas of general theory of relativity.

TEXT BOOKS

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Modern Physics	R. Murugesan	S.Chand & Co	2005
2	Quantum mechanics	V.K. Thangappan	New Age International	2009
3	A text book of quantum mechanics	Mathews & Venkatesan	Tata McGraw Hill	2005
4	Relativity and quantum mechanics	P.K. Palanisamy	Sitech Pub	2002
5	Quantum Mechanics	G. Aruldass	PHI	2004

REFERENCE BOOKS

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Quantum mechanics	Ghatak & Loganathan	Macmillan Publications	2002
2	Introduction to quantum mechanics	Pauling & Wilson	McGraw hill Co	2005
3	Perspective of Modern Physics	Arthur Beiser	McGraw hill Co	2005

CO	Statement	Knowledge Level
CO1	Recall the basics of quantum mechaics	K1
CO2	Understand the postulates of quantum mechanics	K2
CO3	Analyze the wave mechanics in one and three dimension cases	K3
CO4	Extend the applications of wave mechanics	K4

SEMESTER VI

ELECTIVE – II	B.Sc. Physics	2019 - 2020
M19UPHE04	LASER AND SPECTROSCOPY	
Credit: 4		

Objectives

This course deals about the interactions of electromagnetic waves with matters in various forms. It also covers the different regions of the electromagnetic spectrum. It offers through idea about types of LASERs and various spectroscopic techniques to the students.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	M	S	S	S
CO2	M	M	M	S
CO3	S	S	M	S
CO4	M	S	M	M

UNIT I : ATOMIC SPECTROCOPY

Constant deviation spectrometer – Hartmann's formula – fine structure and super fine structure – Solar Spectrum – high resolution Spectroscopy – L. G. plate – Fabry – Perot etalon application

UNIT II : MOLECULAR SPECTROCOPY

Microwave spectroscopy – theory – pure rotational Spectra of diatomic molecules – rigid rotator – symmetric and asymmetric top molecule – microwave spectrometer – microwave oven

UNIT III : LASER PHYSICS

Laser – spontaneous and stimulated emission – population inversion – laser pumping – Einstein's coefficient resonators – vibrational modes of resonators – control resonators – Q- factor – losses in the cavity –Ruby laser – Helium Neon Laser – CO2 laser – solid state laser –Application of lasers in industry, medicine and instrumentation, holography

UNIT IV : INFRARED SPECTROSCOPY

energy of diatomic molecules –simple harmonic oscillator – diatomic vibrating rotator –vibration – rotation spectrum of Carbon Monoxide – Breakdown of the Born Oppenheimer –approximation –interaction of rotation and vibration – techniques and instrumentation – double and single – beam operation

UNIT V : RAMAN SPECTRPSCOPY

Raman effect – classical and quantum theory – molecular polarizability– pure rotational Raman spectra of linear molecules – vibrational Raman spectra – structure determination - vibrational spectroscopy-techniques and instrumentation

TEXT BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1	A text book of Optics	N. Subramaniyam, Brijlal and M.N. Avadhanulu	S. Chand & Co, New Delhi	2012
2	Optics and spectroscopy	R. Murugeshan and Kiruthiga Sivaprasath	S. Chand & Co, New Delhi	2010
3	Fundamentals of molecular spectroscopy	Banwell	Tata Mcgraw Hill, New Delhi	2016

REFERENCE BOOKS:-

S.No	Title of the Book	Author	Publisher	Year of Publication
1	An introduction to Laser theory and application	M.N.Aravamudhan	S. Chand & Co, New Delhi	2012
2	Basic principles of spectroscopy	Chang Raymond	McGrawHill, New Delhi	2003
3	Molecular Structure and Spectroscopy	G. Aruldass	PHI	2007

CO	Statement	Knowledge Level
CO1	Recall the production of LASERs	K1
CO2	Understand the postulates for the production of LASERs	K2
CO3	Analyze the role of IR and Raman in structure analysis	K3
CO4	Elaborate ideas- functional group analysis	K4

SEMESTER VI

ELECTIVE – II	B.Sc.	2019 - 2020
M19UPHE05	MATERIAL SCIENCE	
Credit: 4		

Objectives

The course with the title "Material Science" completely gives the basic ideas about various types of materials and their physical and chemical properties. Also it deals the testing methods in order to know their properties for suitable applications.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	M	S	M	S
CO2	S	M	M	S
CO3	S	S	S	M
CO4	M	M	M	S

Unit I:

Review of Atomic structure – Interatomic Forces – Different types of chemical bonds – Ionic covalent bond or homopolar bond – Metallic bond – Dispersion bond – Dipole bond – Hydrogen bond – Binding energy of a crystal – Elastic properties.

Unit II:

Classification of Polymers – Ceramics – Super strong materials – Cermets – High temperature materials – Thermo electric materials – Electrets – Nuclear engineering materials.

Unit III:

Radiographic methods – Photo elastic method - Magnetic methods – Electrical methods – Ultrasonic methods – Visual and other optical methods – Thermal methods – Surface defect detection by NDT – Equipments used in non destructive testing – Metallurgical microscope – Election microscope – Coolidge x-ray tube – Production of ultrasonic waves – Magnetostriction Ultrasonic generator - Pilzo electric ultrasonic generator.

Unit IV:

Metallic glasses – Fibre reinforced plastics – Metal matrix composites – Material for optical sources and detectors – Fiber optic materials and their applications – Display materials – Acoustic materials and their applications – SAW materials – Biomaterials – High temperature superconductors.

Unit V:

Different mechanical properties of Engineering materials – Creep – Fracture – Technological properties – Factors affecting mechanical properties of a material – Heat treatment - cold and hot working – Types of mechanical tests – metal forming process – Powder – misaligning – Deformation of metals – Bauschinger effect – Elastic after effect – Deformation of crystals and poly crystalline materials.

TEXT BOOKS

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Materials Science	M.Arumugam	Anuradha Publishers	1990
2	Materials Science and Engineering	V.Raghavan	Printice Hall India Ed	2004

CO	Statement	Knowledge Level
CO1	Remember the basic types of bonds	K1
CO2	Identify modern engineering materials	K2
CO3	Analyze suitable characterization techniques for their physical and chemical properties	K3
CO4	Apply the physical laws for various applications such as mechanical properties	K4

SEMESTER VI

ELECTIVE – II	B.Sc. Physics	2019 - 2020
M19UPHE06	PHYSICS IN EVERYDAY LIFE	
Credit: 4		

Objectives

The course gives basic ideas about the applications of Physics in day today life. Also it deals the various types of matters and extension of this concept towards applications such as optics and electricity and magnetism.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	S	S	S	S
CO2	M	M	M	M
CO3	S	M	M	S
CO4	M	S	M	S

UNIT I: MECHANICS

Motion, Force and Newton's laws - momentum - projectile and circular motions - gravitation - planetary motion and earth satellites – communication satellites - work, power and energy - energy and environment – rotational motion.

UNIT II: PROPERTIES OF MATTER

Three states of matter - binding forces - fluid pressure and thrust - applications - Pascal law - Archimedes principle – capillary action - Bernoulli's principle – Viscosity.

UNIT III: HEAT AND SOUND

Measurement of heat and temperature - clinical thermometer – heat transfer - thermos flask - change of state - effect of pressure on boiling point and melting point - heat engines - steam engine and dieselengine – sound and music - reverberation - acoustics of building -recording and reproduction of sound in film.

UNIT IV: ELECTRICITY AND MAGNETISM

Colomb's law - action of points, lightning arrester - Ohm's law -electric power - electrical safety - electromagnetic induction -Faraday's Law - Lenz Law - transformers - mariner's compass.

UNIT V: OPTICS

Light - optical instruments - camera - telescope - microscope -projector - nuclear energy - fission and fusion - nuclear power plants -atom bomb and hydrogen bomb.

TEXT BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Allied Physics I & II	R. Murugeshan	S. Chand & Co, New Delhi	2006
2	Properties of matter and acoustics	R. Murugeshan	S. Chand & Co, New Delhi	2012
3	Heat and Thermodynamics	Brijlal & Dr. N. Subramanyam and P.S. Hemne	S. Chand & Co, New Delhi	2004

REFERENCE BOOKS:-

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Electricity	R. Murugeshan	S. Chand & Co, New Delhi	2012
2	A text book of Optics	N. Subramaniyam, Brijlal and M.N. Avadhanulu	S. Chand & Co, New Delhi	2012
3	Elements of properties of matter	D.S. Mathur	S. Chand & Co, New Delhi	2010

CO	Statement	Knowledge Level
CO1	Recall the basic knowledge of Physics	K1
CO2	Identify the properties of matter	K2
CO3	Analyze various laws of thermodynamics	K3
CO4	Apply the physical laws for various in Heat, Optics.,	K4

SEMESTER VI

SEC – IV	B.Sc.	2019 - 2020
M19UPHS04	NON DESTRUCTIVE TESTING	
Credit: 2		

Objectives

The course with the title "Non Destructive Tesing" completely gives the basic ideas about various types of testing methods in order to know their suitability for various applications. Also it deals the difference between destructive and non destructive tesings.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	M	S	M	S
CO2	S	M	M	M
CO3	M	S	M	M
CO4	M	M	M	S

UNIT1: Introduction to NDT, Comparison between destructive and NDT, Importance of NDT, Scope of NDT, difficulties of NDT, future progress in NDT, economics aspects of NDT.

UNIT II: Liquid Penetrant Inspection: principles, properties required for a good penetrants and developers -Types of penetrants and developers115%1and advantages and limitations of various methods of LPI -LPI technique/ test procedure.

UNIT III: Magnetic Particle Inspection (MPI)-Principles of MPI, basic physics of magnetism, permeability, flux density, cohesive force, magnetizing force, rentivity, residual magnetism 115%1Methods of magnetization, magnetization techniques such as head shot technique, cold shot technique, central conductor testing, magnetization using products using yokes.

UNIT IV: Ultrasonic Testing (UT): principle, types of waves, frequency, velocity, wavelength, reflection, divergence, attenuation, mode conversion in ultrasonic UT testing methods 115%1contact testing and immersion testing, normal beam and straight beam testing, angle beam testing, dual crystal probe.

UNIT V: Radiography Testing (RT): Principle, electromagnetic radiation sources: X-ray source, production of X-rays, high energy X-ray source, gamma ray source -Properties of X-rays and gamma rays 120%1Inspection techniques like SWSI, DWSI, DWDI, panoramic exposure, real time radiography, films used in industrial radiography, types of film, speed of films, qualities of film11screens used in radiography.

TEXT& REFERENCE BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Practical Non Destructive tesing	Baldev Raj	Narosa	2012
2	Non Destructive Testing	S. Ramachandran	Airwalk	2010
3	Manufacturing Processing	P. N. Rao	Tata Mcgraw Hill, New Delhi	2016

CO	Statement	Knowledge Level
CO1	Distinguish between destructive and non destructive testing methods	K1
CO2	Identify suitable testing methods for suitable application	K2
CO3	Inspect materials properties through NDT	K3
CO4	Apply and Extend NDT for low temperature phenomenon	K4

SEMESTER III

NMEC – I	B.Sc. Physics	2019 - 2020
M19NPH01	ESSENTIAL OF ELECTRICITY	
Credit: 4		

Objectives

The present titles elaborate the day to day applications of Physics towards Electricity. Also it provides sound ideas about various terminologies present in Electricity to the students.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	S	M	M	S
CO2	M	M	S	M
CO3	S	S	M	S
CO4	S	S	M	M

UNIT I:
Electrification by friction - two kinds of electricity - capacitor -principle of condenser - types of condensers - fixed condenser -variable condenser.

UNIT II:
Condenser boxes - electrolytic condenser - guard ring - condenser - condenser in series - condensers in parallel.

UNIT III:
Electric field - potential - Ohm's law - electrical energy and power - resistance - types of resistance - fixed resistance - variable resistance.

UNIT IV:
Colour codes - resistance in series - resistance in parallel - Kirchoff's law - application to Wheatstone's network.

UNIT V:
Primary cell - Daniel, Lechlanche, Dry cell - Secondary cell - Lead acid, Nickel (Principle only) - Cadmium cell - rechargeable cell.

TEXT BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Electricity and Magnetism	Brijlal and Subramaniam	S. Chand & Co, New Delhi	2016
2	Electricity and Magnetism	R. Murugeshan	S. Chand & Co, New Delhi	2016

REFERENCE BOOKS:-

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Electricity and Magnetism	D. N. Vasudeva	S. Chand & Co, New Delhi	2016
2	Electricity and Magnetism	K. K. Tewari	S. Chand & Co, New Delhi	2016

CO	Statement	Knowledge Level
CO1	Recall the basic knowledge of Physics	K1
CO2	Identify the terminologies of electricity in Physics	K2
CO3	Analyze various parameters of electricity	K3
CO4	Apply the in cells and batteries	K4

NMEC - II	B.Sc. Physics	2019 - 2020
M19NPH03	BASIC OF ELECTRICITY AND APPLIANCES	
Credit: 4		

Objectives

The present titles elaborate the day to day applications of Physics towards Electricity. Also it provides sound ideas about various terminologies present in Electricity to the students.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	S	M	M	S
CO2	M	M	S	M
CO3	S	S	M	S
CO4	S	S	M	M

UNIT I:

Electrical charge – current – potential – units – Ohm's law – electrical energy – power – watt – kWh – consumption of electrical power – resistance – capacitance – inductance and its units – measuring meter - Galvanometer, ammeter, voltmeter and multimeter.

UNIT II:

Principles of transformers – constructional details – Core type, Shell type – classification of transformers – EMF equation – voltage ratio –current ratio – transformer on no load – auto transformer –applications.

UNIT III:

AC and DC – single phase and three phase connections – three phase transformer – house wiring star-star, star-delta, delta –star connections – overloading – earthing – short circuiting – fuses –cooling of transformers – protective devices and accessories – losses in transformer.

UNIT IV:

Electrical bulbs – fluorescent lamps – inverter – UPS – Stabilizer – principle and operations of fan – wet grinder – mixer – water heater – electric iron box – microwave oven – refrigerator.

UNIT V:

Electric heating – resistance heating – induction heating – high frequency eddy current heating – Dielectric heating – resistance welding – electric arc welding – occupational hazards due to chemical reactions.

TEXT BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1	A text book in electric power	P. L. Soni, P.V. Gupta and V.S.Bhatnagar	Dhanpat rai sons	2016
2	Utilization of electrical energy	E.O. Taylor	Orient Longman	2016
3	A Textbook of Electrical Technology	B.L. Teraja and A.K. Teraja	S. Chand & Co. New Delhi	2006

REFERENCE BOOKS:-

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Arts and Science of utilization of electrical energy	H. Partas	DhanpatRai& Sons, New Delhi	2016
2	An integrated course in electrical engineering	J.B. Gupta	S.K. Kataria & Sons	2013
3	Alternating current electrical engineering	Philip Kemp	M.c.millan	1963

CO	Statement	Knowledge Level
CO1	Recall the basic knowledge of Physics	K1
CO2	Identify the terminologies of electricity in Physics	K2
CO3	Analyze various parameters of electricity	K3
CO4	Apply the in cells and batteries	K4

B.SC. PHYSICS
SEMESTER – I
GENERAL PHYSICS EXPERIMENTS – I

List of experiments

1. Young's Modulus (q) – Non uniform Bending – pin and microscope method.
2. Young's Modulus (q) – Non uniform bending – scale and telescope method.
3. Torsion pendulum – Rigidity Modulus.
4. Surface tension and interfacial surface tension –Drop Weight method.
5. Compound pendulum – Determination of g and k.
6. Sonometer – frequency of a tuning fork –Determination of mass of a stone.
7. Viscosity of a liquid by graduated burette and mercury pellet method
8. Spectrometer – (i–d curve).
9. Spectrometer – Grating – normal incidence–measurement of Wavelength.
10. Potentiometer – calibration of low range Voltmeter.

REFERENCE BOOKS:

1. Ouseph, Srinivasan & Vijayendran, Practical Physics
2. P. R. Sasi Kumar, Practical Physics –, PHI.
3. S. P. Singh, Advanced Practical Physics, Pragathi Prakasam.
4. Practical Physics – St. Joseph College, Trichy.

B.SC. PHYSICS
SEMESTER – II
GENERAL PHYSICS EXPERIMENTS – II

1. P.O. Box – Temperature coefficient of resistance.

2. Lee's Disc – Thermal conductivity of a bad conductor and emissivity.

3. Joule's calorimeter – Specific heat capacity of aliquid – Barton's correction.

4. Current and Voltage sensitivities of a galvanometer.

5. Construction of basic logic gates (AND, OR, NOT) using ICs and verification of truth tables

6. Construction of special logic gates (NAND, NOR, EX–OR) using ICs and verification of truth tables.

7. Low range power pack using two diodes.

8. Specific heat capacity of a liquid – method of mixtures – Half time correction.

9. Sonometer –Determination AC frequency

10. Forward bias and reverse bias characteristics of zener diode

REFERENCE BOOKS:

1. Ouseph, Srinivasan & Vijayendran, Practical Physics

2. P. R. Sasi Kumar, Practical Physics –, PHI.

3. S. P. Singh, Advanced Practical Physics, Pragathi Prakasam.

4. Practical Physics – St. Joseph College, Trichy.

B.SC. PHYSICS
SEMESTER – III
GENERAL PHYSICS EXPERIMENTS – III

List of experiments

1. Young's modulus (q) – uniform bending – pin and microscope.

2. Young's modulus (q) – uniform bending – scale and telescope method.

3. Static Torsion – Rigidity modulus.

4. Torsion Pendulum – Moment of Inertia and Rigidity modulus – symmetrical masses.

5. Surface tension of a liquid –capillary rise method.

6. Sonometer–relative density of solid and liquid

7. Specific heat capacity of a liquid by cooling – verification of Newton's law of cooling.

8. Air Wedge – thickness of a wire and its insulation.

9. Spectrometer – grating – minimum deviation –Determination of wavelength of mercury lamp.

10. Potentiometer – ammeter calibration.

11. Potentiometer – Specific resistance of the given coil and length of second coil without unwinding.

REFERENCE BOOKS

1. Ouseph, Srinivasan &Vijayendran, Practical Physics

2. P. R. Sasi Kumar, Practical Physics –, PHI.

3. S. P. Singh, Advanced Practical Physics, Pragathi Prakasam.

4. Practical Physics – St. Joseph College, Trichy.

B.SC. PHYSICS

SEMESTER – III & IV

GENERAL PHYSICS EXPERIMENTS – IV

1. M and BH – Deflection Magnetometer – TAN A and TAN B position.

2. Field along the axis of a coil – deflection magnetometer –determination of BH.

3. Carey–Foster's bridge – Specific resistance of a coil.

4. BG – Comparison of Capacities.

5. BG – Comparison of EMF's of two cells.

6. Zener diode – Voltage regulator using four diodes and percentage of regulation.

7. Verification of De Morgan's theorem.

8. Bridge rectifier

9. NAND and NOR gates as universal building block (Construction of AND, OR & NOT)

REFERENCE BOOKS

1. Ouseph, Srinivasan &Vijayendran, Practical Physics

2. P. R. Sasi Kumar, Practical Physics –, PHI.

3. S. P. Singh, Advanced Practical Physics, Pragathi Prakasam.

4. Practical Physics – St. Joseph College, Trichy.

B.SC. PHYSICS
SEMESTER – V
GENERAL PHYSICS EXPERIMENTS – V

List of experiments

1. Cantilever - Young's modulus (q) - mirror and Telescope.
2. Coefficient of viscosity - ungraduated burette - radius by mercury pellet.
3. Newton's rings - refractive index of a lens.
4. Spectrometer - i - i' curve.
5. Spectrometer - small angled prism.
6. Potentiometer - calibration of high range voltmeter.
7. Comparison of two low resistances by a potentiometer.
8. Deflection magnetometer - m and BH - Tan C position.
9. Determination of thermo e.m.f - direct method – spot galvanometer.
10. Copper Voltameter-M and B .H
11. B.G. - Charge Sensitivity.
12. B.G. - Determination of absolute capacity.
13. B.G. - Measurement of High resistance by leakage.
14. FET – Characteristics.
15. UJT – Characteristics.
16. SCR – Characteristics.
17. Hartley Oscillator.
18. Colpitt's Oscillator.
19. Microprocessor 8085 – Addition and Subtraction.
20. Microprocessor 8085 –Multiplication and Division.

REFERENCE BOOKS

1. Ouseph, Srinivasan &Vijayendran, Practical Physics

2. P. R. Sasi Kumar, Practical Physics –, PHI.

3. S. P. Singh, Advanced Practical Physics, Pragathi Prakasam.

4. Practical Physics – St. Joseph College, Trichy.

B.SC. PHYSICS
SEMESTER – VI
GENERAL PHYSICS EXPERIMENTS – VI

List of experiments

1. Koenig's method - non - uniform bending.
2. Koenig's method - uniform bending.
3. Bifilar pendulum - Parallel threads.
4. Spectrometer - dispersive power of a grating.
5. Spectrometer - Cauchy's constant.
6. Potentiometer - EMF of a thermocouple.
7. Field along the axis of a coil - vibration magnetometer.
8. Carey Foster's bridge - temperature coefficient of resistance
9. Astable multivibrator using 555 timer
10. Monostable multivibrator using 555 timer
11. RS - flip flops using NAND and NOR gates.
12. RC coupled amplifier - single stage.
13. Common source FET Amplifier.
14. Operational amplifier-Inverting and Non inverting.
15. Operational amplifier-Adder and Subtractor.
16. Operational amplifier - Integrator and Differentiator.
17. V-I Characteristics of LED.
18. BCD to Seven segment display.
19. Half adder and Full adder.20. Half subtractor and Full subtractor.

REFERENCE BOOKS

1. Ouseph, Srinivasan &Vijayendran, Practical Physics

2. P. R. Sasi Kumar, Practical Physics –, PHI.

3. S. P. Singh, Advanced Practical Physics, Pragathi Prakasam.

4. Practical Physics – St. Joseph College, Trichy.

SEMESTER - III

Allied - III	B.Sc. Computer Science	2019 - 2020
M19UPHA01	ALLIED – III - APPLIED ELECTRONICS	
Credit: 4		

Preamble & Objectives

This course presents the principles of Arithmetic circuits with flip flop's and registers. It also includes the counters, non-sinusoidal oscillators and operational amplifiers.

Course Outcomes

On the successful completion of the course, students will be able to

CO	Statement	Knowledge Level
CO1	Understand the concepts of Half adder-Full adder	K2
CO2	Remember to design RS FLIP FLOP using NOR and NAND gates	K1
CO3	Apply the Counters with 2R binary ladder method	K3
CO4	Understand the Classification of non sinusoidal oscillators	K2
CO5	Analyze to design the Operational Amplifiers	K4

UNIT I

Binary, Octal, Hexadecimal - interconversion - Gray code - excess 3-code - ASCII code - basic gates - Demorgan's theorem - universal gates.

UNIT II

Laws of Boolean algebra - solving Boolean expression - K-map- minterms - SOP - K-map simplification using minterm (2, 3 and 4 variables) - POS - K-map simplification using max terms (2, 3 and 4 variables) - incomplete specified functions.

Unit III

Types of DC machines - DC generators - emf equation - Open circuit and load characteristics of different types of DC generators - DC motors - Principle of operation - Types - Torque equation -Characteristics – Starters.

Unit IV

Principle of operation - emf equation - Phasor diagram - Equivalent circuit - OC and SC tests – Basic principles of auto transformer and three phase transformer

Unit V

Principle of Indicating instruments- moving coil, moving iron and dynamometer type instruments Extension of range of voltmeter and ammeter - Measurement of 3 phase power by two wattmeter method – Principle and working of Induction type energy meter- DC slide wire, potentiometer – Wheat stone bridge - Kelvin's double bridge - AC bridges - Schering bridge, Maxwell's bridge

Text Books				
S.No	**Author**	**Title of the Book**	**Publisher**	**Year of Publication**
1.	Malvino and Leach	Digital principles and applications	TMH	
2.	Vijayendran, S. Viswanathan	Digital fundamentals	Printers and Publishers Pvt. Ltd	
3.	Virendra Kumar	Digital electronics	New Age International Publishers	
4	V.K.Metha	Fundamentals of Electronics	S.CHAND Publications	
5	Mathur	Fundamentals of Electronics	S.CHAND Publications	

Mapping with Programme Outcomes

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	M	M	S	M	S
CO2	S	M	S	M	S
CO3	M	S	M	S	S
CO4	M	M	S	M	S
CO5	S	M	S	M	S

S- Strong; **M**-Medium

SEMESTER - III

Allied Practical - I	B.Sc. Computer Science	2019 - 2020
M19UPHAP01	ALLIED PRACTICAL – I - BASIC ELECTRONICS - I	
Credit: 2		

Preamble & Objectives

To understand the concepts of Gates and its operations.

Course Outcomes

On the successful completion of the course, students will be able to

CO	Statement	Knowledge Level
CO1	Remember the basic operators	K1
CO2	Understanding the Logic Gates	K2
CO3	Applying Arithmetic Operations	K3
CO4	Analyzing the Half and full adder	K4
CO5	Apply the concept of Seven segment display	K3

1. Verify the truth tables of OR, AND, NOT, NAND, NOR and EX-OR Gates.
2. Construct NOT, NOR, OR, AND, EX-OR Gates using NAND gates.
3. Construct NOT, NOR, OR, AND, EX-OR Gates using NOR gates.
4. Verify Demorgan's theorem using suitable IC's.
5. Draw the characteristic curves for given JFET & find the parameters of JFET.
6. Construct the 4 bit binary added and subtraction using IC 7483 and IC7486 verify their truth table.
7. Construct the half adder and full adder and to verify their truth tables.
8. Determine the characteristics of uni junction transistor.
9. Construct the BCD binary number to decimal number by seven segments.
10. Construct shift resistor, ring counter and ring counter using IC- 7473.

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	S
CO2	S	S	M	S	M
CO3	M	S	S	M	S
CO4	S	M	M	S	S
CO5	M	S	S	M	M

S- Strong; **M**-Medium

SEMESTER - IV

Allied - IV	B.Sc. Computer Science	2019 - 2020
M19UPHA02	ALLIED – IV - ADVANCED ELECTRONICS	
Credit: 4		

Preamble & Objectives

This course presents the principles of Arithmetic circuits with flip flop's and registers. It also includes the counters, non-sinusoidal oscillators and operational amplifiers.

Course Outcomes

On the successful completion of the course, students will be able to

CO	Statement	Knowledge Level
CO1	Understand the concepts of Half adder-Full adder	K2
CO2	Remember to design RS FLIP FLOP using NOR and NAND gates	K1
CO3	Apply the Counters with 2R binary ladder method	K3
CO4	Understand the Classification of non sinusoidal oscillators	K2
CO5	Analyze to design the Operational Amplifiers	K4

UNIT: I Arithmetic Circuits

Introduction-Half adder-Full adder-Half subtractor-Full subtractor-Decoder-BCD to seven segment decoder-Encoder-Decimal to BCD encoder-multiplexer-applications-demultiplexer

UNIT: II Flip Flop's And Registers

Introduction-RS FLIP FLOP using NOR and NAND gates-clocked RS flip flop –D flip flop-JK flip flop- Master Slave JK flip flop-Registers-Shift Registers (Right to left and left to right)-applications

UNIT: III Counters

Introduction-Counters-modulus of a counter-asynchronous counter-synchronous counter-BCD counter-D/A conversion-R-2R binary ladder method-A/D conversion-successive approximation

UNIT: IV Non-sinusoidal Oscillators

Introduction-Classification of nonsinusoidal oscillators-Multivibrators-Astable multivibrator- Monostable multivibrator -Bistable multivibrator-Applications of Multivibrators-Schmitt Trigger

UNIT: V Operational Amplifiers

Introduction-Operational overview-Op-amp parameters-Inverting amplifier-Non-inverting amplifier-Summing amplifier-Differential amplifier-Op-amp applications-Integrator –Differentiator-Opamp based Wein-bridge oscillator-Square wave Relaxation Ocsillator.

Text Books

S.No	Author	Title of the Book	Publisher	Year of Publication
1.	B.R. Gupta and V. Singhal	Digital electronics	S.K.Kataria &Sons Publishers.	
2.	R.S. Sedha	Applied Electronics	S. Chand & Company Ltd	
3.	Malvino and Leach	Digital principles and applications	TMH.	
4.	Vijayendran, S. Viswanathan	Digital fundamentals	S. Viswanathan Printers and Publishers Pvt. Ltd	
5.	Virendra Kumar	Digital electronics	New Age International Publishers	

Reference Books

S.No	Author	Title of the Book	Publisher	Year of Publication
1.	Avinash Kapoor	Digital electronics	Krishna PrakasanMandhir, 9, Shivaji Road, Meerut (UP).	1994
2.	Maheswari	Principles and Practice of electronics	Emerald Publishers, 135, Anna Salai, Chennai – 600002.	1988
3.	A. P. Godse	Digital electronics	Technical Publlsher, Pune	
4.	Morris Mano	Digital Logic and Computer Design	PHI	

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	M	S
CO2	S	M	S	M	S
CO3	M	S	M	S	S
CO4	M	M	S	M	S
CO5	S	M	S	M	S

S- Strong; **M**-Medium

SEMESTER - IV

Allied Practical - II	B.Sc. Computer Science	2019 - 2020
M19UPHAP02	ALLIED PRACTICAL – II	
Credit: 2	BASIC ELECTRONICS - II	

Preamble & Objectives

To understand the Advanced concepts using flip flops, Encode, decoders.

Course Outcomes

On the successful completion of the course, students will be able to

CO	Statement	Knowledge Level
CO1	Remember the basic operations of multiplexer	K1
CO2	Understanding the concept of flip flop	K2
CO3	Applying subtractor concepts	K3
CO4	Analyzing the amplifiers.	K4
CO5	Apply the concept of analog convertor	K3

1. Multiplexer & de- Multiplexer.
2. Encoder & decoder.
3. Flip flop using gates.
4. Half –subractor & full–subractor.
5. UJT characteristic.
6. Astable multivibrator using 555 timer
7. Operational amplifier adder and subractor.
8. Digital to analog convertor binary weighted method.

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	S
CO2	S	S	M	S	M
CO3	M	S	S	M	S
CO4	S	M	M	S	S
CO5	M	S	S	M	M

S- Strong; **M**-Medium

Allied - I	B.Sc. Mathematics & Chemistry	2019 - 2020
M19UPHA03	ALLIED I – PHYSICS- I	
Credit: 5		

Preamble & Objectives

The present allied course will be helpful to the students with the background Mathematics and Chemistry as a valuable input towards Physics.

Course outcomes

On the successful completion of the course, students will be able to

CO	Statement	Knowledge Level
CO1	Remember the concepts of Mechanics	K1
CO2	Understand the various Properties of matter	K2
CO3	Analyze the nature and transfer of heat	K3
CO4	Apply various Physics laws in Optics and Electricity	K4

UNIT I- Mechanics

Projectile - range up and down an inclined plane - impulse and impact - laws of impact coefficient of restitution - direct impact between two spheres - compound pendulum- theory - determination of acceleration due to gravity. Newton's law of gravitation - determination of gravitational constant - Boy's method.

UNIT II : Properties of Matter

Bending of beams - expressions for bending moment - expression for the depression of the free end of the cantilever - uniform and nonuniform bending - theory and experiment - torsion - expression for couple per unit twist - torsion pendulum - theory - rigidity modulus by static torsion. Surface tension and interfacial surface tension drop weight method.

UNIT III : Heat

Specific heats: Determination of Cp and Cv - Van-der waal's equation - critical constants and their determination - expressions for critical constants - thermal conductivity of a bad conductor - Lee's disc method Joule - Thomson effect - porous plug experiment - theory - inversion temperature - Boyle temperature - liquefaction of Helium.

UNIT IV : Optics

Small angled prism - formation of two thin prisms to produce dispersion without deviation and deviation without dispersion - constant deviation spectroscope. Interference - air wedge - thickness of a wire - Jamin's Interferometer - Polarisation - specific rotatory power and its determination.

UNIT V : Electricity

Carey Foster's bridge - Theory - Measurement of resistance.Potentiometer- Low range voltmeter and Ammeter calibration -Theory of moving coil Ballistic Galvanometer - Determination of current and voltage sensitivities.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	M	S	S	S
CO2	M	S	M	M
CO3	S	M	S	M
CO4	M	M	M	M

TEXT BOOKS & REFERENCE:

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Mechanics and mathematical methods	R. Murugesan	S. Chand & Co	2005
2	Properties of matter	R. Murugasan	S. Chand & Co	2005
3	Properties of matter	Brijlal and N. Subramaniam	S. Chand & Co	2005

Allied - II	B.Sc. Mathematics & Chemistry	2019 - 2020
M19UPHA04	ALLIED II – PHYSICS- II	
Credit: 5		

Preamble & Objectives

The present allied course will be helpful to the students with the background Mathematics and Chemistry as a valuble input towards Physics.

Course outcomes

On the successful completion of the course, students will be able to

CO	Statement	Knowledge Level
CO1	Remember the concepts of Atomic Physics	K1
CO2	Understand the various nature of nucleus	K2
CO3	Analyze the nature interaction of energy with matter	K3
CO4	Apply various Physics laws in electronics	K4

UNIT I : Atomic Physics

Vector atom model - Spatial quantization - spinning electron - Quantum numbers associated with vector atom model - Coupling schemes - LS and jj coupling - Pauli's exclusion principle - periodic classifications of elements example of electron configuration - Stern and Gerlach experiment.

UNIT II : Nuclear Physics and Solid state Physics

Nuclear models - liquid drop model - Semi empirical mass formula - merits and demerits - shell model - evidences. Nuclear radiation detectors - Ionisation chamber - Geiger Muller Counter - Wilson cloud chamber. Particle accelerator - Betatron. Solid state physics - bonding in crystals - ionic bond - covalent band - metallic bond - molecular bond - hydrogen bond.

UNIT III : Spectroscopy

Basic theory of IR spectrum - single beam experiment - applications - Theory of Raman spectroscopy - vibrational spectrum - applications - electronic spectra - Basic theory of NMR and ESR.

UNIT IV : Basic Electronics

Semi conductor physics - construction and characteristics of FET, UJT - Multivibrator - Astable - Monostable - Bistable - basic circuits. Operational amplifier - differentiator and integrator.

UNIT V : Digital Electronics

Binary, Hexadecimal numbers and their inter conversion - Laws of Boolean algebra - De Morgan's theorems - NAND and NOR as universal blocks - simplification of Boolean expression.

TEXT BOOKS & REFERENCE:

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Modern Physics	R. Murugesan	S. Chand & Co	2005
2	Digital Principles and application	Malvino & Leach	TMH	2005
3	Principles of Electronics	V.K. Metha	S. Chand & Co	2005
4	Modern Physics	J.B. Rajam	S. Chand & Co	2004
5	Hand book of Electronics	Gupta & Kamar	Pragathi Prakashan	2006

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	M	S	M	S
CO2	S	M	M	S
CO3	S	S	S	M
CO4	S	M	M	S

SEMESTER IV

Allied Practical- II	B.Sc. Mathematics & Chemistry	2019 - 2020
M19UPHAP03	ALLIED II – PHYSICS- II	
Credit: 3		

List of experiments

1. Young's modulus (q) –non–uniform bending – scale and telescope method.

2. Young's modulus (q) – uniform bending – scale and telescope method.

3. Static Torsion – Rigidity modulus of a rod

4. Torsion Pendulum – Rigidity modulus of a wire.

5. Surface tension and interfacial surface tension of a liquid –drop weight method.

6. Sonometer – frequency of a tuning fork

7. Sonometer – AC frequency

8. Air Wedge – thickness of a wire.

9. Newton's rings –determination of wavelength of light

10. Spectrometer –Refractive index of a solid prism.

11. Spectrometer – grating –normal incidence –Determination of wavelength of mercury lamp.

12. Determination of viscosity using graduated burette

13. Specific heat capacity of a liquid –half time correction.

14. Potentiometer – calibration of ammeter.

15. Potentiometer – calibration of low range voltmeter.

16. Potentiometer –Determination of internal resistance of a cell.

17. Characteristics of zener diode.

18. Verification of truth tables of AND, OR & NOT gates using ICs.

19. Construction of low range power pack using two diodes.

20. Verification of De Morgan's theorems

மதிப்புக் கல்விப்பாடம்
(Value Education)

பாடநோக்கம்

இளம் வயது முதல், உடல், மனம் இரண்டையும் பக்குவமாக வைத்துக் கொள்ள வேண்டியதன் அவசியத்தை மாணவர்களுக்கு உணரச் செய்தல்.

அலகு 1

யோகமும் உடல்நலமும்

உடலமைப்பு – எளியமுறை உடற்பயிற்சி – மகராசனம் - யோகாசனங்கள்

அலகு 2

இளமைகாத்தல் - பாலுணர்வும் ஆன்மீகமும் - மனதின் 10 படிநிலைகள் - மன அலைச்சுழல்.

அலகு 3

குணநலப்பேறு

வாழ்வின் நோக்கம் - எண்மை ஆராய்தல் - ஆசை சீரமைத்தல் - சினம் தவிர்த்தல்.

அலகு 4

கவலை ஒழித்தல் - வாழ்த்தும் பயனும் - நட்பு நலம் - தனிமனித அமைதி.

அலகு 5

செயல்விளைவுத் தத்துவம் - மனத்தூய்மை, வினைத்தூய்மை – அன்பும் கருணையும் - பண்பாட்டுக் கல்வி.

பாடநூல்:

'மனவளக்கலை யோகா'
உலக சமுதாய
சேவா சங்கம்
வேதாத்திரி பதிப்பகம்
156, காந்திஜி ரோடு
ஈரோடு – 638 001.
போன்: 0424 – 2263845.

பார்வை நூல்கள்:

மனவளக்கலை யோகா –I - உலக சமுதாய சேவா சங்கம் மனவளக்கலை யோகா –II- வேதாத்திரி பதிப்பகம் மனவளக்கலை யோகா – III-156, காந்திஜி ரோடு எளிமுறை உடற்பயிற்சி - ஈரோடு – 638 001. யோகப்பயிற்சிகள் - போன்: 0422-2263845

Common Paper for all Under Graduate

Environment Studies

Unit – I – Fundamentals

Environment – Definition, Scope, Structure and Function of Ecosystems – Producers, Consumer and Decomposers – Energy Flow in the Ecosystem – Ecological Succession – Food Chain, Food Webs and Ecological Pyramids – Concept of Sustainable Development.

Unit – II – Natural Resources

Renewable Resources – Air, Water, Soil, Land and Wildlife resources, Non-Renewable Resources, Coal, Oil and Natural Gas, Environment problems related to the extraction and use of Natural Resources.

Unit – III – Biodiversity

Biodiversity – Definition – Values – Consumption use, Production Social, Ethical, Aesthetic and Option Values Threats to Biodiversity – Hotspots of Biodiversity – Conservation of Biodiversity: In-situ, Ex-situ, Bio-Wealth National and Global Level.

Unit – IV – Environmental Pollution

Definition – Causes, Effects and Mitigation Measures – Air, Water, and Soil Pollution, Noise Pollution, Thermal pollution, Nuclear Hazards, Solid Wastes, Acid Rain, Climate change and Global Warming, Environmental Laws and Regulations in India – Earth summit.

Unit – V – Pollution and Environment

Population Explosion – Environment and Human Health – HIV/AIDS – Women and Child Welfare – Resettlement and rehabilitation of people, Role of Information Technology in Environmental Health – Environment Awareness, Environmental Awareness, Environment Disaster Management – Fire Safety and Prevention.