MAHENDRA ARTS & SCIENCE COLLEGE
(Autonomous)
Affiliated to Periyar University, Salem.
Accredited by NAAC with 'A' Grade & Recognized u/s 2(f) and 12(B) of the UGC Act 1956
Kalippatti – 637 501, Namakkal (Dt), Tamil Nadu.

DEPARTMENT OF PHYSICS

Number of Courses Focusing on Employability/ Entrepreneurship/ Skill Development

Programme : B.Sc. PHYSICS

S.No.	Year	Total No. of Courses	Employability (1)	Entrepreneurship (2)	Skill development (3)	Total No. of Courses (1+2+3)
1	2020-2021	24	4	-	2	6
2	2019-2020	38	4	-	2	6
3	2018-2019	38	4	-	2	6
4	2017-2018	24	2	-	2	4
5	2016-2017	11	1	-	1	2

Head of the Department

Dr. V. HARIHARAN, M.Sc.,M.Phil.,Ph.D.,
Asst. Professor & Head,
Department of Physics,
Mahendra Arts & Science College,
Kalipatti-637 501.

Principal

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(Autonomous)
Kalippatti (PO) - 637 501, Namakkal (DT)

DEPARTMENT OF PHYSICS

List of Courses Focusing on Employability/ Entrepreneurship/ Skill Development
(Regulations – 2019)

Programme : B.Sc. PHYSICS

S.No.	Course Name	Course Code	Employability	Entrepreneurship	Skill development
1.	Solar Energy	M19UPHS01	-	-	✓
2.	Optical Instruments	M19UPHS02	✓	-	-
3.	Bio Physics	M19UPHS03	✓	-	✓
4.	Non Destructive Testing	M19UPHS04	✓	-	-
5.	Essential Of Electricity	M19NPH01	✓	-	-
6.	Basics Of Electricity And Appliances	M19NPH03	✓	-	✓
7.	Allied Chemistry – I	M19UCHA01	-	-	✓
8.	Allied Chemistry – II	M19UCHA02	-	-	✓
9.	Allied Mathematics – I	M19UMAA01	✓	-	-
10.	Allied Mathematics – II	M19UMAA02	✓	-	-
11.	Business Communication	M19UCMN02	✓	-	-
12.	Applied Statistics	M19USTN01	✓	-	-

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DEPARTMENT OF PHYSICS

List of Courses Focusing on Employability/ Entrepreneurship/ Skill Development
(Regulations – 2019)

Programme : B.Sc. PHYSICS

S.No.	Name of the Course	Course Code	Employability/ Entrepreneurship/ Skill development	Year of introduction (during the last five years)
1.	Solar Energy	M19UPHS01	Skill Development	2019 - 2020
2.	Optical Instruments	M19UPHS02	Employability	2019 - 2020
3.	Bio Physics	M19UPHS03	Employability & Skill Development	2019 - 2020
4.	Non Destructive Testing	M19UPHS04	Employability	2019 - 2020
5.	Essential Of Electricity	M19NPH01	Employability	2019 - 2020
6.	Basics Of Electricity And Appliances	M19NPH03	Employability & Skill Development	2019 - 2020
7.	Allied Chemistry – I	M19UCHA01	Skill Development	2019 - 2020
8.	Allied Chemistry – II	M19UCHA02	Skill Development	2019 - 2020
9.	Allied Mathematics – I	M19UMAA01	Employability	2019 - 2020
10.	Allied Mathematics – II	M19UMAA02	Employability	2019 - 2020
11.	Business Communication	M19UCMN02	Employability	2019 - 2020
12.	Applied Statistics	M19USTN01	Employability	2019 - 2020

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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

PRINCIPAL
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(Autonomous)
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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 L	Hrs / Week P	No. of Credits	Max. Mark Int.	Max. Mark Ext.	Max. Mark Total
I	LANGUAGE COURSE – I	TAMIL - I	M19UFTA01	5	-	3	25	75	100
II	LANGUAGE COURSE - II	ENGLISH - I	M19UFEN01	5	-	3	25	75	100
III	CORE COURSE - I	PROPERTIES OF MATTER AND SOUND	M19UPH01	6	-	5	25	75	100
III	ALLIED COURSE - I	ALLIED –I MATHEMATICS - I	M19UMAA01	6	-	4	25	75	100
III	CORE PRACTICAL-I	GENERAL PHYSICS EXPERIMENTS - I	M19UPHP01	-	3	3	40	60	100
III	ALLIED PRACTICAL- I	ALLIED PRACTICAL – I MATHEMATICS	M19UMMAP01	-	3	-	-	-	-
IV	ECC-I	VALUE ADDED YOGA	M19UVE01	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 L	Hrs / Week P	No. of Credits	Max. Mark Int.	Max. Mark Ext.	Max. Mark Total
I	LANGUAGE COURSE - I	TAMIL - II	M19UFTA02	5	-	3	25	75	100
II	LANGUAGE COURSE - II	ENGLISH - II	M19UFEN02	5	-	3	25	75	100
III	CORE COURSE - II	MECHANICS	M19UPH02	6	-	5	25	75	100
III	ALLIED COURSE - II	ALLIED –II MATHEMATICS - II	M19UMAA02	6	-	4	25	75	100
III	CORE PRACTICAL - II	GENERAL PHYSICS EXPERIMENTS - II	M19UPHP02	-	3	3	40	60	100
III	ALLIED PRACTICAL - I	ALLIED PRACTICAL – I MATHEMATICS	M19UMAAP01	-	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	M19UFTA03	5	-	3	25	75	100
II	LANGUAGE COURSE - II	ENGLISH - III	M19UFEN03	5	-	3	25	75	100
III	CORE COURSE -III	HEAT AND THERMODYNAMICS	M19UPH03	5	-	5	25	75	100
III	ALLIED COURSE -III	ALLIED –III-CHEMISTRY - I	M19UCHA01	5	-	4	25	75	100
III	CORE PRACTICAL –III	GENERAL PHYSICS EXPERIMENTS - III	M19UPHP03	-	3	3	40	60	100
III	ALLIED PRACTICAL –II	ALLIED PRACTICAL – II CHEMISTRY	M19UCHAP01	-	3	-	-	-	-
IV	SEC –I	SEC – I SOLAR ENERGY	M19UPHS01	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	M19UFTA04	5	-	3	25	75	100
II	LANGUAGE COURSE-II	ENGLISH - IV	M19UFEN04	5	-	3	25	75	100
III	CORE COURSE-IV	WAVE AND OPTIC S	M19UPH04	5	-	5	25	75	100
III	ALLIED COURSE – IV	ALLIED –IV-CHEMISTRY - II	M19UCHA02	5	-	4	25	75	100
III	CORE PRACTICAL –IV	GENERAL PHYSICS EXPERIMENTS - IV	M19UPHP04	-	3	3	40	60	100
III	ALLIED PRACTICAL –II	ALLIED PRACTICAL – II CHEMISTRY	M19UCHAP01	-	3	2	40	60	100
IV	SEC-II	SEC – II OPTICAL INSTRUMENTS	M19UPHS02	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	M19UPH05	5	-	5	25	75	100
III	CORE COURSE –VI	BASIC ELECTRONICS	M19UPH06	5	-	5	25	75	100
III	CORE COURSE -VII	NUMERICAL METHODS	M19UPH07	5	-	5	25	75	100
III	CORE COURSE -VIII	SOLID STATE PHYSICS	M19UPH08	5	-	5	25	75	100
III	ELECTIVE COURSE -I	ELECTIVE –I	-	5	-	4	25	75	100
III	CORE PRACTICAL - V	GENERAL PHYSICS EXPERIMENTS - V	M19UPHP05	-	3	3	40	60	100
IV	SEC-III	SEC-III BIO PHYSICS	M19UPHS03	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	M19UPH09	6	-	5	25	75	100
III	CORE COURSE -X	NUCLEAR PHYSICS	M19UPH10	6	-	5	25	75	100
III	CORE COURSE – X1	QUANTUM MECHANICS AND RELATIVITY	M19UPH11	6	-	5	25	75	100
III	ELECTIVE COURSE- II	ELECTIVE –II	-	5	-	4	25	75	100
III	CORE PRACTICAL – VI	GENERAL PHYSICS EXPERIMENTS - VI	M19UPHP06	-	3	3	40	60	100
III	PROJECT COURSE	PROJECT – VIVA VOCE	M19UPHPR01	2	-	2	40	60	100
IV	SEC-IV	SEC-IV- NON DESTRUCTIVE TESTING	M19UPHS04	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	M19UMAA01
II	ALLIED II: MATHEMATICS – II ALLIED PRACTICAL – I: MATHEMATICS	M19UMAAP01
III	ALLIED III: CHEMISTRY - I	M19UCHA01
IV	ALLIED IV: CHEMISTRY – II ALLIED PRACTICAL – II: CHEMISTRY	M19UCHAP01

ALLIED SUBJECTS OFFERED FOR OTHER MAJOR STUDENTS

Semester	Course Title	Course Code
III	ALLIED 1: PHYSICS – I	M19UPHA01
IV	ALLIED II: PHYSICS – II ALLIED PRACTICAL – I: PHYSICS	M19UPHAP01
III	ALLIED III: ADVANCED ELECTRONICS & ALLIED PRACTICAL: BASIC ELECTRONICS – I	M19UPHA02 & 03
IV	ALLIED IV: APPLIED ELECTRONCS & ALLIED PRACTICAL: BASIC ELECTRONICS - II	M19UPHAP02 & 03

ELECTIVE SUBJECTS FOR B.Sc. Physics STUDENTS

Semester	ELECTIVE – I	
	Course Title	**Course Code**
V	Mathematical Physics	M19UPHE01
	Radiation Physics	M19UPHE02
	Applied Physics	M19UPHE03
	ELECTIVE – II	
	Course Title	**Course Code**
VI	Laser and Spectroscopy	M19UPHE04
	Material Science	M19UPHE05
	Physics in everyday life	M19UPHE06

SKILL ENCHANCEMENT COURSES:

Semester	Course Title	Course Code
III	Solar Energy	M19UPHS01
IV	Optical instruments	M19UPHS02
V	Bio physics	M19UPHS03
VI	Non Destructive Testing	M19UPHS04

NON - MAJOR ELECTIVE COURSES:[FOR OTHER DEPARTMENTS]

Semester	Course Title	Course Code
III	Essential of Electricity	M19NPH01
IV	Basic of Electricity And Appliances	M19NPH03

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.

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

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– Carnot̓s 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

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

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

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

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

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

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

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

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

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
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

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

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

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

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 – CO_2 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.Aravamu dhan	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

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

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
	Apply the physical laws for various in Heat,	

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 developers and 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 Methods 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: <mark>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.</mark>

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

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

MAHENDRA ARTS & SCIENCE COLLEGE
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Affiliated to Periyar University, Salem.
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DEPARTMENT OF PHYSICS

List of Courses Focusing on Employability/ Entrepreneurship/ Skill Development
(Regulations – 2016)

Programme : B.Sc. PHYSICS

S.No.	Course Name	Course Code	Employability	Entrepreneurship	Skill Development
1.	Properties of Matter and Sound	M16UPH01	✓	-	✓
2.	Mechanics	M16UPH02	✓	-	✓
3.	Space Science	M16UPHS02	✓	-	✓
4.	Optics	M16UPH04	-	-	✓
5.	Bio Medical Instrumentation	M16UPHS03	✓	-	-
6.	Electrical Appliances	M16UPHS05	✓	-	-
7.	Allied Chemistry – I	M16UCHA01	-	-	✓
8.	Allied Chemistry – II	M16UCHA02	-	-	✓
9.	Allied Mathematics – I	M16UMAA01	✓	-	-
10.	Allied Mathematics – II	M16UMAA02	✓	-	-
11.	Business Communication	M16UCMN02	✓	-	-
12.	Applied Statistics	M16USTN01	✓	-	-

Head of the Department

Dr. V. HARIHARAN, M.Sc.,M.Phil.,Ph.D.,
Asst. Professor & Head,
Department of Physics,
Mahendra Arts & Science College,
Kalipatti-637 501.

Principal

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DEPARTMENT OF PHYSICS

List of Courses Focusing on Employability/ Entrepreneurship/ Skill Development
(Regulations – 2016)

Programme : B.Sc. PHYSICS

S.No.	Name of the Course	Course Code	Employability/ Entrepreneurship/ Skill development	Year of introduction (during the last five years)
1.	Properties of Matter and Sound	M16UPH01	Employability & Skill Development	2016 - 2017
2.	Mechanics	M16UPH02	Employability & Skill Development	2016 - 2017
3.	Space Science	M16UPHS02	Employability & Skill Development	2016 - 2017
4.	Optics	M16UPH04	Skill Development	2016 - 2017
5.	Bio Medical Instrumentation	M16UPHS03	Employability	2016 - 2017
6.	Electrical Appliances	M16UPHS05	Employability	2016 - 2017
7.	Allied Chemistry – I	M16UCHA01	Skill Development	2016 - 2017
8.	Allied Chemistry – II	M16UCHA02	Skill Development	2016 - 2017
9.	Allied Mathematics – I	M16UMAA01	Employability	2016 - 2017
10.	Allied Mathematics – II	M16UMAA02	Employability	2016 - 2017
11.	Business Communication	M16UCMN02	Employability	2016 - 2017
12.	Applied Statistics	M16USTN01	Employability	2016 - 2017

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Kalippatti – 637 501, Namakkal (Dt), Tamil Nadu.

BACHELOR OF SCIENCE

CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR B.Sc. PHYSICS

For the students
admitted from the
Academic Year 2016-2017 onwards

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DEPARTMENT OF PHYSICS
UG – Syllabus (B.Sc)

1. Eligibility:

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 conducted by the Government of Tamil Nadu or an examination accepted as equivalent there to by the Syndicate subject to the conditions as may be prescribed thereto are permitted to appear and qualify for B.Sc., (Physics) degree examination of this University after a course of study of three academic years.

2. Duration of the Course:

The course for the degree of Bachelor of Science shall consist of three years divided into six semesters with internal assessment.

3. Course of Study:

The course of study shall comprise instruction in the following subjects according to the syllabus and books prescribed from time to time.

4. Examinations:

The theory examination shall be three hours duration to each paper at the end of each semester. The candidates failing in any subject(s) will be permitted to appear for each failed subject(s) in the subsequent examination.

5. Passing Minimum:

The candidate shall be declared to have passed the examination if the candidate secures not less than 30 (External) and 10 (Internal) marks in each theory paper. For the practical paper a minimum of 24 (External) and 10 (Internal) marks the record notebook taken together is required to pass the examination. There is no passing minimum for record notebook. However submission of record notebook is a must.

6. Question Paper Pattern:

Time: 3 Hours   Max Marks-75

Part A: 10 x 2 = 20

(Answer all questions)

(Two questions from each unit)

Part B: 5 x 5 = 25

(Answer all questions)

(One question from each unit with internal choice)

Part C: 3 x 10 = 30

(Answer any three questions)

(In Part C out of total 5 questions 2 questions may be problem oriented)

7. Classification of Successful candidates:

Candidates who secure not less than 60% of the aggregate marks in the whole examination in First Class. All other successful candidates shall be declared to have passed in Second Class.

Candidates who obtain 75% of the marks in the aggregate shall be deemed to have passed in First Class with Distinction provide they pass all the examinations prescribed for the course at first appearance. Candidates who pass all the examinations prescribed for the course in the first attempt and within a period of three academic years from the year of admission to the course alone are eligible for University Ranking.

8. Maximum duration for the completion of UG Program:

The maximum duration for the completion of UG Program shall not exceed six years.

9. Commencement of this Regulation:

These regulations shall take effect from the academic year 2016-17 and thereafter.

10. Pattern of Question Paper for Practical Examinations;

Each set of question paper should contain SEVEN questions and the candidate has to choose one by lot.

11. Awarding of marks for Practical examinations.

Total Marks: 100 (Internal 40 Marks + External 60 Marks)

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DEPARTMENT OF PHYSICS (2016 Regulations)
UG – Syllabus (B.Sc)

COURSE STRUCTURE

SEM	SUBJECT CODE	PAPER TITILE	HRS / WEEK	CREDIT	INT. MARK	EXT. MARK
I	M16UFTA01	TAMIL – I	5	3	25	75
	M16UFEN01	ENGLISH – I	5	3	25	75
	M16UPH01	CORE – I PROPERTIES OF MATTER AND SOUND	6	5	25	75
	M16UMAA01	ALLIED MATHS - I	6	4	25	75
	M16UPHP01	CORE PRACTICAL - I	3	-	40	60
	M16UMAAP01	ALLIED MATHS PRACTICAL - I	3	-	40	60
	M16UVE01	VALUE EDUCATION – MANALAKKALAI YOGA	2	2	25	75

SEM	SUBJECT CODE	PAPER TITILE	HRS / WEEK	CREDIT	INT. MARK	EXT. MARK
II	M16UFTA02	TAMIL – II	5	3	25	75
	M16UFEN02	ENGLISH – II	5	3	25	75
	M16UPH02	Core II – MECHANICS	5	5	25	75
	M16UMAA02	ALLIED MATHS - II	5	4	25	75
	M16UPHP01	Core Practical – I	3	3	40	60
	M16UMAAP01	Allied Practical - I	3	3	40	60
	M16UPHS01	SBEC – I: ENERGY PHYSICS	2	2	25	75
	M16UES01	ENVIRONMENTAL STUDIES	2	2	25	75

Total Credit for I & II Semesters = 42 Credits

SEM	SUBJECT CODE	PAPER TITLE	HRS / WEEK	CREDIT	INT. MARK	EXT. MAR
III	M16UFTA03	TAMIL – III	5	3	25	75
	M16UFEN03	ENGLISH – III	5	3	25	75
	M16UPH03	Core III – HEAT AND THERMODYNAMICS	5	5	25	75
	M16UCHA01	ALLIED CHEMISTRY - I	5	4	25	75
	M16UPHP02	Core Practical – II	3	-	40	60
	M16UCHAP01	ALLIED CHEMISTRY PRACTICAL - I	3	-	40	60
	M16UPHS02	SBEC – II: SPACE SCIENCE	2	2	25	75
	M16UPHN01	NMEC – I: STATISTICS	2	2	25	75

SEM	SUBJECT CODE	PAPER TITLE	HRS / WEEK	CREDIT	INT. MARK	EXT. MAR
IV	M16UFTA04	TAMIL – IV	5	3	25	75
	M16UFEN04	ENGLISH – IV	5	3	25	75
	M16UPH04	Core IV – OPTICS	5	5	25	75
	M16UCHA02	ALLIED CHEMISTRY - II	5	4	25	75
	M16UPHP02	Core Practical – II	3	3	40	60
	M16UCHAP01	Allied Practical - II	3	3	40	60
	M16UPHN02	NMEC II: C-PROGRAMMING	2	2	25	75
	M16UVE01	VALUE EDUCATION 1: CELL PHONE SERVICES	2	2	25	75

Total Credit for III & IV Semesters = 44 Credits

SEM	SUBJECT CODE	PAPER TITLE	HRS / WEEK	CREDIT	INT. MARK	EXT. MAR
V	M16UPH05	ATOMIC PHYSICS	5	5	25	75
	M16UPH06	MATHEMATICAL PHYSICS	5	5	25	75
	M16UPHE01	CORE ELECTIVE I: ADVANCED ELECTRONICS	5	5	25	75
	M16UPHE02	CORE ELECTIVE II: BIO PHYSICS	5	5	25	75
	M16UPHS03	SBEC III: BIO MEDICAL INSTRUMENTATION	2	2	25	75
	M16UPHS04	SBEC IV: APPLIED PHYSICS	2	2	25	75
	M16UPHP03	CORE PRACTICAL: III	3	-	40	60
	M16UPHP04	CORE PRACTICAL: IV	3	-	40	60

SEM	SUBJECT CODE	PAPER TITLE	HRS / WEEK	CREDIT	INT. MARK	EXT. MAR
VI	M16UPH07	NUCLEAR PHYSICS	5	5	25	75
	M16UPH08	QUANTUM MECHANICS AND RELATIVITY	5	5	25	75
	M16UPH09	MATERIALS SCIENCE	5	5	25	75
	M16UPHE03	CORE ELECTIVE III: NANO SCIENCE & TECHNOLOGY	5	5	25	75
	M16USE05	SBEC V: ASTRO PHYSICS	2	2	25	75
	M16UPHP03	CORE PRACTICAL: III	3	3	40	60
	M16UPHP04	CORE PRACTICAL: IV	3	3	40	60
		MINI PROJECT	2	1	-	100
		EXTENSION ACTIVITIES		1		

Total Credit for V & VI Semesters = 59 Credits

Examination hours : **3 (For all the semesters)**

Total Marks : **100 (For all the semesters)**

Total Credits : **145 (For 6 semesters)**

M16UPH01 - PROPERTIES OF MATTER AND SOUND

UNIT I

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 - non uniform bending - 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 with mass.

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.

BOOKS FOR STUDY :

1. Elements of properties of matter by D. S. Mathur S. Chand & Co., (2005).

2. Properties of matter by R. Murugesan, S. Chand & Co., (2005).

3. Properties of matter by Brijlal and N. Subramaniam S. Chand & Co., (2005).

4. Properties of matter and Acoustics by R. Murugesan, S. Chand & Co., (2005).

5. A Text Book of Sound by N. Subramaniam and Brijlal, S. Chand & Co., (2005).

BOOKS FOR REFERENCE:

1. Fundamentals of General Properties of Matter, H.R. Gulati, S. Chand & Co., (2005).

2. Properties of Matter, Subramania Iyer and Ranga Rajan, Viswanathan Publication (2002).

3. A Text Book of Sound (2005), R. L. Saighal, S. Chand & Co.,

M16UPH02 - MECHANICS

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 - conservation theorems using Lagrangian function - generalized momentum, energy, time and linear and angular momentum.

Books for Study:

1. Mechanics and Mathematical Methods by R. Murugesan. S.Chand and Co.

2. Dynamics by M. Narayanamurthi and M. Nagarathnam, The National Publishing Company.

3. Statics, Hydrostatics and Hydrodynamics by Narayanamurthi and M. Nagarathnam, The National Publishing Company.

Books for Reference:

1. Classical Mechanics by H. Goldstein Addition Wesley Publications

2. Mechanics by D.S. Mathur, S. Chand and Co.,

THERMAL PHYSICS – M16UPH03

UNIT I

Thermometry and Calorimery: Platinum resistance thermometer -correction   -   advantages   - definition of specific heat capacity - determination of specific heat by Newton's law of cooling - two specific heat capacities of a gas - determination of Cv by Joly's differential steam calorimeter - determination of Cp by Regnault's method.

UNIT II

Low temperature physics: Joule - Thomson effect - porous plug - theory and experiment - liquification of gases by Linde's process -Helium by K. Onnes method - properties of Helium I and Helium II - adiabatic demagnetisation - practical applications of low temperature in cryogenic engines and air conditioning machines.

UNIT III

Thermodynamics: Zeroth, first and second laws of thermodynamics - reversible and irreversible processes - heat engines - Carnot's petrol and diesel engines - their efficiency - entropy - change in entropy in reversible and irreversible processes - Third law of thermodynamics-Temperature - entropy diagram.

UNIT IV

Conduction and Radiation: Thermal Conductivity - definition - thermal conductivity of a bad conductor - Lee's disc method - good conductor - Searle's method - radiation - Blackbody radiation - definition - Wien's Displacement law - Rayleigh Jean's law - Planck's law - Stepan's law and experimental verification of Stepan's law - Solar constant - temperature of the sun - by Angstrom's Pyrheliometer.

UNIT V

Maxwell's Thermodynamic relations: Derivation of Maxwell's thermodynamic relations-Helmholtz function- Gibb's function- Enthalpy- T-ds equation- Clausius- Clapeyron's Latent heat equation - specific heat relations.

TEXT BOOK :

1. Brijlal and Subramaniam, Heat and Thermodynamics, S. Chand & Co, New Delhi 2004.

2. D. S. Mathur, Heat and Thermodynamics, S. Chand & Co, New Delhi 2004.

BOOKS FOR REFERENCE :

1. J. B. Rajam and C. L. Arora, Heat and Thermodynamics, S. Chand & Co, New Delhi 2004.

2. A. B. Gupta and H. Roy, Thermal Physics, Allied Books, New Delhi 2002.

3. M.W. Zeemansky and R.H. Diffman, Heat and Thermodynamics, PHI,

SPACE SCIENCE – M16UPHS02

UNIT I: Universe

Planets - interior planets - exterior planets - crust, mantle and core of the earth - different -region of earth's atmosphere - rotation of the earth - magnetosphere - Van Allen belts – Aurora.

UNIT II : Comets, Meteors, Asteroids

Composition and structure of comets- periodic comets- salient features of asteroids, meteors and its use.

UNIT III : Sun

Structure of photosphere, chromosphere, corona - sunspots - solar flares - solar prominences - solar piages -satellites of planets - structure, phases and their features of moon.

UNIT IV : Stars

Constellations - binary stars - their origin and types star clusters- globular clusters - types of variable stars - types of galaxies.

UNIT V : Origin of Universe

Big bang theory - pulsating theory - steady state theory - composition of universe expansion.

Reference :

1. K.D. Abyankar, Astrophysics of the solar system, University press, India.

2. Baidyanath Basu, An introduction to Astrophysics, Prentice Hall of India, New Delhi.

3. Prof. P. Devadas, The fascinating Astronomy, Published by Devadas Telescopies, 2, Charkrapani Road, Guindy, Chennai.

4. Elements of Space Physics - R.P. Singhal, PHI.

M16UPH04- OPTICS

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 AND OPTICAL INSTRUMENTS

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.

Books for Study:

1. A text book of Optics - N. Subramaniyam and Brij lal, Revised by M.N. Avadhanulu, S. Chand & Co, New Delhi., 2004.

2. Optics and Spectroscopy R. Murugesan and Kiruthiga Sivaprasath, S.Chand & Co, New Delhi., 2006

3. Geometrical and Physical Optics - P. K. Chakrabarti, New Central Book Agency (P) Ltd, Kolkata., 2005.

4. Optics - D.R. Khanna and H.R. Gulati, R. Chand & Co, New Delhi., 1979.

5. Engineering Physics - G. Vijayakumari, Vikas Publications.

Books for Reference:

1. Optics - Eugene Hecht, Fourth Edition, Pearson Education, New Delhi. 2007.

2. Fundamentals of Optics - Jerkins A Francis and White E Harvey, McGraw Hill Inc., New Delhi, 1976.

3. Optical Physics - S.G. Lipson, H. Lipson and D.S. Tannhauser, Cambridge University Press. 1995.

4. Fundamentals of Optics - M.G. Raj, Anmol Publications Pvt. Ltd., New Delhi, 1996.

ELECTRICITY AND MAGNETISM – M16UPH05

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

Books for Study:

1. Electricity and Magnetism - Brijlal and Subramaniam, S. Chand & Co., (2005).

2. Electricity and Magnetism - R. Murugesan, S. Chand & Co., (2005).

Books for Reference:

1. Electricity and Magnetism - D. N. Vasudeva, S. Chand & Co., (2005).

2. Electricity and Magnetism- K. K. Tewari, S. Chand & Co., (2005)

BASIC ELECTRONICS – M16UPH06

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 -feedback 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.

Books for Study:

1. Basic Electronics (Solid state), B.L. Theraja, S. Chand & Co., (2000).

2. Principles of Electronics, Metha, V.K. S. Chand & Co., (2001).

Books for Reference:

1. Foundations of electronics, D. Chattopadhyay and etal., New Age International Publishers (1999).

2. Hand book of Electronics - Gupta & Kumar, Pragati Prakhasan (2005).

NUMERICAL METHODS – M16UPHE01

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.

Books for study:

1. Introductory methods of numerical analysis - S.S. Sastry, Prentice Hall of India, New Delhi 2000 Edition.

2. Numerical methods - A. Singaravelu, Meenakshi Agency, Chennai (2001).

3. Numerical method in Science and Engineering   - M.K. Venkataraman, PHI - New Delhi, 1997.

4. Mechanics and Mathematical methods, R. Murugesan, S. Chand & Co, New Delhi - 1999.

SOLID STATE PHYSICS – M16UPHE05

UNIT I : CRYSTAL STRUCTURE

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 : CRYSTALLOGRAPHY AND CRYSTAL IMPERFECTIONS

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 : MAGNETIC PROPERTIES

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 : DIELECTRIC PROPERTIES

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: MODERN ENGINEERING MATERIALS

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

Books for Study:

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.

Books for Reference:

1. Materials Science and Engineering - Raghavan (2004).

2. Introduction to Solids - Azaroff (2004).

3. Solid State Physics - A.J. Deckker (2004).

BIO - MEDICAL INSTRUMENTATION – M16UPHS03

UNIT I

Electro - Cardiography (ECG) - Electromyography (EMG) - Electro - Encephelograph (EEG) - Phonocardiography.

UNIT II

Pacemakers - introduction- external and internal pacemakers -artificial heart valves - (principle - block diagram and operation).

UNIT III

Anesthesia machine - recording fetal heart movements and blood circulation using doppler ultrasonic method - laser based Doppler blood flow meter - Blood cell counter - B.P. measurement - direct and indirect method - Haemocytometer - counting of RBCs and WBCs.

UNIT IV

Radiation safety instrumentation- effects of radiation exposure -radiation monitoring instruments - pocket dosimeter - pocket type radiation alarm.

UNIT V

Area monitoring instruments - physiological effects due to current passage - micro shock and macro shock - electrical accidents in hospital - micro shock hazards - macro shock hazards.

Books for Study and Reference:

1. Bio-medical Instrumentation- Dr. M. Arumugam- Anuradha Agencies.
2. Bio instrumentation - John G. Webster, editor - John Wiley & Sons, Inc.
3. Biological Instrumentation and methodology, P.K. Bajpai.

DIGITAL ELECTRONICS – M16UPHS04

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

Half adder - Full adder - Half subtractor - Full subtractor - Decoder - BCD to seven segment decoder - Encoder - decimal to BCD encoder - multiplexer - applications - de-multiplexer.

UNIT IV

RS Flip flop using NOR and NAND gates - clocked RS flip flop - D flip flop- JK fliplop- Master Slave JK flip flop- Registers- Shift Registers (right to left and left to right) - applications.

UNIT V

Counters - modulus of a counter - asynchronous counter (4-bits) - synchronous counter (3-bits) - BCD counter - D/A conversion - R-2R binary ladder method - A/D conversion - successive approximation.

Books for study :

1. Digital principles and applications - Malvino and Leach, TMH.

2. Digital fundamentals - Vijayendran, S. Viswanathan Printers and publishers Pvt. Ltd.,

3. Digital electronics - Virendra Kumar, New Age International Publishers.

ATOMIC PHYSICS – M16UPH07

UNIT - I

Photoelectric effect - Lenard's method to determine e/m for photoelectrons - Richardson and Compton experiment - relation between photoelectric current and retarding potential-elation between velocity of photoelectrons and frequency of light -failure of electromagnetic theory -Einstein's light quantum hypothesis and photoelectric equation - experimental verification of photoelectric equation - Millikan's experiment.

UNIT - II

Positive ray analysis - Thomson's parabola method- theory-determination of e/m and mass of positive ions- Astons mass spectrograph determination of masses of isotopes- uses of mass spectrographs - separation of isotopes- mass spectrograph method -diffusion method- thermal diffusion method- pressure diffusion method.

UNIT - III

Theory of alpha scattering - Rutherford scattering formula -experimental verification -nature of privileged quantum orbits - Bohr's correspondence principle - effect of motion of nucleus - evidences in favour of Bohr's theory - Determination of critical potential - Davis and Goucher's method - Sommerfield's relativistic atom model -application to fine structure of Hα line.

UNIT - IV

Description of vector atom model - quantum numbers associated with vector atom model - coupling schemes - J.J. coupling – LScoupling - application of spatial quantisation - Pauli's exclusion principle - the selection rule - intensity rule- Lande's g factor –Bohr magneton -
applications of vector atom model - electron configuration - magnetic dipole due to spin - Stern - Gerlach experiment.

UNIT - V

Spectral terms and notations - fine structure of Sodium D lines - fine structure of Hα line - Zeeman effect - Larmor's theorem-Quantum mechanical explanation of normal Zeeman effect-anomalous Zeeman effect of D1 and D2 lines of Sodium-Paschen – Bach effect - Stark effect.

Books for study:

1. Modern Physics - by R. Murugesan, S. Chand & Co. (2004).

2. Atomic Physics - J.B. Rajam, S. Chand & Co. (2004).

3. Atomic and Nuclear Physics - by N. Subramanyam and Brijlal,S. Chand & co. (2004).

Books for Reference:

1. Atomic specra by White(2003), Mc Graw Hill Intl.Book Company.

2. Atomic and Nuclear Physics by H. Semat and J.R. Albright, Chapman and Hall (2003).

3. Atomic and Nuclear Physics by T.A. Littlefields and Thorley, ELBS (2003).

4. Atomic and Nuclear Physics by S.N. Ghoshal, S. Chand &Co (2004).

NUCLEAR PHYSICS – M16UPH08

UNIT - I : RADIOACTIVITY

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- originof line and continuous spectrum Fermi's theory of beta decay - K electron capture - Nuclear Isomerism.

UNIT - II : NUCLEAR DETECTORS

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

UNIT - III : ARTIFICIAL TRANSMUTATION

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 : NUCLEAR STRUCTURE

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, fusion and elementary particles

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.

Books for Study:

1. Modern Physics by R. Murugesan, S.Chand & Co., (2005)

2. Atomic Physics by J.B. Rajam, S.Chand & Co., (2005)

3. Nuclear Physics by D.C.Tayal, Himalaya Publishing House.

Books for Reference:

1. A Source book on Atomic energy by Samuel Glass Stone (2002)

2. Atomic and Nuclear Physics by Albrignt Semat (2003)

3. Atomic and Nuclear Physics by Little field and Thorley. ELBS (2002)

4. Basic Nuclear Physics and Cosmic rays, B.N. Srivatsava, Pragti Prakasham.

5. Concepts of Nuclear Physics, Bernald L. Cohen, TMH.

QUANTUM MECHANICS AND RELATIVITY - M16UPH09

UNIT I : WAVE NATURE OF MATTER

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 : POSTULATES

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 1 D

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

UNIT IV: APPLICATION OF WAVE MECHANICS IN 3 D

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 : RELATIVITY

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.

Books for Study:

1. Modern Physics, R. Murugesan, S.Chand & Co., New Delhi.

2.Quantum mechanics, V.K. Thangappan, New Age   International, New Delhi.

3. A text book of quantum mechanics, Mathews & Venkatesan, Tata McGraw Hill, New Delhi.

4. Relativity and quantum mechanics, P.K. Palanisamy, Sitech Pub., Kumbakonam.

5. Quantum Mechanics, G. Aruldass, PHI.

Books for Reference:

1. Quantum mechanics- Ghatak & Loganathan, MacmillanPublications.

2. Introduction to quantum mechanics - Pauling & Wilson, McGraw hill Co., New York.

3. Perspective of Modern Physics -   Arthur Beiser, McGraw hill Co., New York.

4. Quantum mechanics - V. Devanathan.

5. Quantum Mechanics in Physics and Chemistry with applications   to Biology - Rabi Majumdar, PHI.

LASER AND SPECTROSCOPY - M16UPHE09

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

The energy of diatomic molecules - the simple harmonic oscillator - the diatomic vibrating rotator - the vibration - rotation spectrum of Carbon Monoxide - Breakdown of the Born Oppenheimer - approximation - the 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.

Books for study and reference :

1. Principles of Optics - D.S. Mathur.

2. Atomic Physics - J.B. Rajam, S. Chand & Co.,

3. Fundamentals of molecular spectroscopy - Banwell, Tata Mcgraw Hill, New Delhi.

4. An introduction to Laser theory and application- M.N.Aravamudhan, S.Chand & Co.

5. Basic principles of spectroscopy - Chang Raymond, Mc Graw Hill.

6. Spectroscopy (Atomic and Molecular) - Gurdeep R. Chatwal etal, Himalaya Publishing House.

7. Laser systems and applications - Nityanand Chowdry and Richa Verma, PHI.

8. Molecular Structure and Spectroscopy - G. Aruldass, PHI.

ELECTRICAL APPLIANCES - M16UPHS05

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.

Books for study and also for reference :

1. A text book in electric power - P. L. Soni, P.V. Gupta and V.S. Bhatnagar.
2. Utilization of electrical energy - E.O. Taylor, Orient Longman.
3. Arts and Science of utilization of electrical energy - H. Partas, M/s. Dhanpat Raji & Sons, New Delhi.
4. A course in electrical power - J.B. Gupta, M/S. Jaataris & Sons.
5. A text book in electrical technology - B.L. Teraja, S. Chand & Co. , New Delhi.
6. A text book in electrical technology - A.K. Teraja, S. Chand & Co., New Delhi.
7. Alternating current machines - Philip Kermp

MICROPROCESSOR AND ITS APPLICATIONS - M16UPHS06

UNIT I

Microcomputer - microprocessor development - terms related to microprocessor - 8085 microprocessor - architecture.

UNIT II

8085- word length, address registers - block diagram of microprocessor - ALU - accumulator - instruction format - assembly language programming.

UNIT III

Counter - stack pointer - internal data bus - addressing modes - instruction set - mneumonics - communication with microprocessor - polling and interrupt.

UNIT IV

Programs for i) 8 bit addition ii) 8 bit subtraction iii) multiplication and division iv) Greatest and smallest number in an array of 8 bit unsigned numbers.

UNIT V

v) Arranging numbers in ascending and decending order vi) D/A conversion vii) A/D conversion viii) Sum of N numbers ix) bubble sort method.

Books for Study:

1. Introduction to Microprocessor - P. Mathur, TMH.

2. Microprocessor principles and Application - Gilmore, TMH.

3. Fundamentals of Microprocessor 8085 - V. Vijayendran, SVPublication.

Books for Reference:

1. Microprocessor Architecture Programming and application   -Gaonkar.

2. Advanced Microprocessor and Peripherals - A.K. Roy and K.M. Bunchandi, TMH.

3. Ten days with 8085 MicroProcessor - K.A. Krishnamurthy, PHI.

Allied Physics – I – M16UPHA01

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 C_p and C_v - 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.

Books for Study and Reference:

1. Mechanics and mathematical methods - R. Murugesan, S.Chand & Co.

2. Properties of matter - R. Murugesan, S. Chand & Co.

3. Heat and Thermodynamics - Brijlal and Subramaniam, S. Chand & Co.

4. Optics and Spectoscopy - R. Murugesan, S. Chand & Co.

5. Electricity and Magnetism - R. Murugesan, S. Chand & Co.

ALLIED PHYSICS PRACTICALS

List of experiments

01. Young's Modulus - non uniform bending - Scale and Telescope.

02. Young's Modulus - uniform bending - Scale and Telescope.

03. Torsion pendulum - rigidity modulus.

04. Static torsion - rigidity modulus.

05. Surface tension and interfacial surface tension - drop weight method.

06. Specific heat capacity of liquid - method of mixtures -half time radiation correction.

07. Lee's disc - coefficient of thermal conductivity of a bad conductor.

08. Sonometer - frequency of fork.

09. Air Wedge - thickness of wire.

10. Newton's rings - radius of curvature.

11. Spectrometer - wavelength of mercury lines - grating - minimum deviation method.

12. Potentiometer - Voltmeter calibration.

13. Potentiometer - Ammeter calibration.

14. Field along the axis of a coil - BH (Compass box).

15. Zener diode - characteristics.

16. Low range power pack - using two diodes.

M16UPHA02 - Allied Physics : II

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.

Books for Study & Reference: :

1. Modern Physics, R. Murugesan, S.Chand & Co., Twelfth Edition.

2. Digital Principles and application, Malvino & Leach , TMH.

3. Principles of Electronics - V.K. Metha, S. Chand & Co.,

4. Modern Physics, J.B. Rajam, S. Chand & Co

5. Hand book of Electronics, Gupta & Kamar, Pragathi Prakashan.