

# B.Sc., PHYSICS

## Syllabus

Program Code: UPH

2018- Onwards



**MANNAR THIRUMALAI NAICKER COLLEGE**

(AUTONOMOUS)

Re-accredited with “A” Grade by NAAC

PASUMALAI, MADURAI – 625 004

### **Qualification for Admission**

Candidate should have passed the Higher Secondary Examination conducted by the Board of Higher Secondary Education, Government of Tamil Nadu with Physics as one of the subject in Higher Secondary Education.

### **Duration of the Course**

The Students shall undergo the prescribed B.Sc (Physics) course of study for a period of three academic years (six semesters).

### **Subject of Study**

- Part I: Tamil
- Part II: English
- Part III:
  - 1. Core Subjects
  - 2. Allied Subjects
  - 3. Electives
- Part IV :
  - 1. Non Major Electives
  - 2. Skill Based Subjects
  - 3. Environmental Studies
  - 4. Value Education
- Part V :
  - Extension activities

### **The scheme of Examination**

The components for continuous internal assessment are:

Two tests and their average	--15 marks
Seminar /Group discussion	--5 marks
Assignment	--5 marks
Total	--25 marks

## Pattern of the questions paper for the continuous Internal Assessment

(For Part I, Part II, Part III , NME & Skilled Paper in Part IV )

The components for continuous internal assessment are:

### Part –A

Six multiple choice questions (answer all) 6 x 01= 06 Marks

### Part –B

Two questions (‘either .... or ‘type) 2 x 07=14 Marks

### Part –C

One question out of two 1 x 10 =10 Marks

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Total 30 Marks  
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Pattern of the question paper for the Summative Examinations:

**Note: Duration- 3 hours**

### Part –A

Ten multiple choice questions 10 x 01 = 10 Marks

(No Unit shall be omitted; not more than two questions from each unit.)

### Part –B

Five Paragraph questions (‘either .... or ‘type) 5 x 07 = 35 Marks

(One question from each Unit)

### Part –C

Three Essay questions out of five 3 x 10 =30 Marks

(One question from each Unit)

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Total 75 Marks  
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## The Scheme of Examination (Environmental Studies and Value Education)

Two tests and their average --15 marks

Project Report --10 marks\*

Total --25 marks

\*\* The students as Individual or Group must visit a local area to document environmental assets – river / forest / grassland / hill / mountain – visit a local polluted site – urban / rural / industrial / agricultural – study of common plants, insects, birds – study of simple ecosystem – pond, river, hill slopes, etc.

### Question Paper Pattern

#### Pattern of the Question Paper for Environmental Studies & Value Education only (Internal)

##### Part –A

(Answer is not less than 150 words)

Four questions ('either .... or 'type) 4 x 05=20 Marks

##### Part –B

(Answer is not less than 400 words)

One question ('either .... or 'type) 1 x 10=10 Marks

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Total 30 Marks  
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#### Pattern of the Question Paper for Environmental Studies & Value Education only (External)

##### Part –A

(Answer is not less than 150 words)

Five questions (either or type) 5 x 06 =30 Marks

(One question from each Unit)

##### Part –B

(Answer is not less than 400 words)

Three questions out of Five 3 x 15 = 45 Marks  
each unit (One question from each Unit) -----

**Total** 75 Marks  
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#### Minimum Marks for a Pass

40% of the aggregate (Internal +Summative Examinations).

No separate pass minimum for the Internal Examinations.

27 marks out of 75 is the pass minimum for the Summative Examinations.

## **PROGRAMME EDUCATION OUTCOMES:**

**PEO1:** The accumulation of facts of nature and the ability to develop an understanding and knowledge of the basic Physics.

**PEO2:** The ability to use this knowledge to analyze new situations and learn skills and interpret the results and make predictions for the future developments.

**PEO3:** Apply knowledge of Physics in theoretical and laboratory skills to unfamiliar contexts to identify and analyse problems in Physics

**PEO4:** Demonstrate Physics-related technological skills that are relevant to employment opportunities.

## **PROGRAMME OUTCOMES**

**PO1: Disciplinary knowledge and skills:** Capable of demonstrating

(i) good knowledge and understanding of major concepts, theoretical principles and experimental findings in Physics and its different subfields like Astrophysics, Atomic Physics, Nano Physics, Nuclear Physics, Condensed matter Physics, including broader interdisciplinary subfields like Chemistry, Mathematics, Environmental studies, Computer science, etc.

(ii) ability to use modern instrumentation and laboratory techniques to perform experiments in almost all the fields of Physics.

**PO2: Critical thinker and problem solver:** Ability to employ critical thinking and efficient problem solving skills in all the basic areas of Physics.

**PO3: Conduct Investigations of Problems :** Capability for asking relevant questions relating to the problems in the field of Physics, and planning, executing and reporting the results of a experimental investigation.

**PO4: Skilled project manager:** Capable of identifying resources required for a project, and manage a project through to completion, while observing responsible and ethical scientific conduct; and safety and laboratory regulations and practices.

**PO5: National and international perspective:** The graduates should be able to develop a national as well as international perspective for their career in the chosen field of the academic activities.

**PO6: Life-long learners:** Capable of self-directed learning for improving skill development in all areas of physics.

**PO7: Professional Ethics:** The graduate should be capable of demonstrating ability to think and analyze rationally with scientific outlook and identify ethical issues related to one's work and avoid misrepresentation of data.

### **PROGRAMME SPECIFIC OUTCOMES**

**PSO1:** To equip the students with specific knowledge and skills required for higher education.

**PSO2:** To enable the students to know the basic concepts and to enable the students find employment in public and private sector undertakings.

**PSO3:** To Cover the Concepts, Definitions, Properties matter, Electricity, Electromagnetism, Astro Physics, Atomic Physics, Nuclear and Particle Physics, Digital Electronics, Material Science and Microprocessors.

**PSO4:** To help the students to analyze the circuit models and to design the circuit

## COURSE PATTERN

Study Component	I Sem	II Sem	III Sem	IV Sem	V Sem	VI Sem	Total Hours	Total Credits	No. Of Courses	Total marks
Part –I Tamil	6(3)	6(3)	6(3)	6(3)			24	12	4	400
Part – II English	6(3)	6(3)	6(3)	6(3)			24	12	4	400
Part –III										
Core Subjects	4(4)	4(4)	4(4)	4(4)	5(5) 5(5)	5(5) 5(5)	36	36	8	800
Core Elective					4(4)	4(4)	8	8	2	200
Core Subject(P) Project	2(0)	2(2)	2(0)	2(2)	3(0) 3(0) 2(0)	3(5) 3(6) 2(4)	24	19	5	500
Allied Subject - I	6(4)	6(4)	4(4)	4(4)	-	-	20	16	4	400
<b>Allied Subject – I (T)</b>	<b>4(4)</b>	<b>4(3)</b>	<b>4(4)</b>	<b>4(3)</b>			<b>16</b>	<b>14</b>	<b>4</b>	<b>400</b>
<b>Allied Subject – I (P)</b>	<b>2(0)</b>	<b>2(1)</b>	<b>2(0)</b>	<b>2(1)</b>			<b>8</b>	<b>2</b>	<b>2</b>	<b>200</b>
Allied Subject - II (T)			4(3)	4(3)	4(3)	4(3)	16	12	4	400
Allied Subject - II (P)			2(0)	2(2)	2(0)	2(2)	8	4	2	200
Part – IV										
Skill Based Subject	2(2) 2(2)	2(2) 2(2)			2(2)	2(2)	12	12	6	600
Non Major Elective			2(2)	2(2)			4	4	2	200
EVS/ Value Education	2(2)	2(2)					4	4	2	200
Part – V										
Extension activities				0(1)			0	1	1	100
<b>Total</b>	<b>30 (20)</b>	<b>30 (22)</b>	<b>30 (19)</b>	<b>30 (24)</b>	<b>30 (19)</b>	<b>30 (36)</b>	<b>180</b>	<b>140</b>	<b>44</b>	<b>4400</b>

SEMESTER – I							
Subject Code	Title of the Paper	No. of Courses	Hours/Week	Credits	Maximum Marks		
					Int	Ext	Tot
18UTAG11	<b>Part- I Tamil Subject</b> தற்கால கவிதையும் உரைநடையும்	1	6	3	25	75	100
18UENG11	<b>Part – II English Subject</b> Exploring Language Through Literature-I	1	6	3	25	75	100
18UPHC11	<b>Part-III Core Subject</b> Properties of matter, Thermodynamics and Acoustics	1	4	4	25	75	100
18UPHCP1	Major Physics Practical - I	-	2	-	-	-	-
18UMTA11	<b>Part-III Allied Subject</b> Allied Mathematics – I	1	6	4	25	75	100
18UPHA11	<b>Allied Physics – I</b> <b>Mechanics, Properties of Matter and Relativity</b>	1	4	4	25	75	100
18UPHAP1	<b>Allied Physics Practical - I</b>	-	2	-	-	-	-
18UPHS11	<b>Part-IV Skill Subject</b> Basic Instrumentation	1	2	2	25	75	100
18UPHS12	Basics of C Programming	1	2	2	25	75	100
18UEVG11	<b>Part-IV Mandatory Subject</b> Environmental Studies	1	2	2	25	75	100
	<b>Total</b>	<b>7</b>	<b>30</b>	<b>20</b>	<b>175</b>	<b>525</b>	<b>700</b>
SEMESTER – II							
Subject Code	Title of the Paper	No. of Courses	Hours/Week	Credits	Maximum Marks		
					Int	Ext	Tot
18UTAG21	<b>Part- I Tamil Subject</b> பக்தி இலக்கியமும் நாடகமும்	1	6	3	25	75	100
18UENG21	<b>Part – II English Subject</b> Exploring Language Through Literature-II	1	6	3	25	75	100
18UPHC21	<b>Part-III Core Subject</b> Electricity and Magnetism	1	4	4	25	75	100
18UPHCP1	Major Physics Practical - I	1	2	2	40	60	100
18UMTA21	<b>Part-III Allied Subject</b> Allied Mathematics – II	1	6	4	25	75	100
18UPHA21	<b>Allied Physics – II</b>	1	4	3	25	75	100
18UPHAP1	<b>Thermal Physics and Sound</b> <b>Allied Physics Practical - I</b>	1	2	1	40	60	100
18UPHS21	<b>Part-IV Skill Subject</b> Basic Photography	1	2	2	25	75	100
18UPHSP1	Programming in C - Lab	1	2	2	40	60	100
18UVLG21	<b>Part-IV Mandatory Subject</b> Value Education	1	2	2	25	75	100
	<b>Total</b>	<b>8</b>	<b>30</b>	<b>22</b>	<b>230</b>	<b>570</b>	<b>800</b>

For B.Sc  
Mathematics  
Students

For B.Sc  
Mathematics  
Students



SEMESTER – III								
Subject Code	Title of the Paper	No. of Courses	Hours /Week	Credits	Maximum Marks			
					Int	Ext	Tot	
18UTAG31	<b>Part- I Tamil Subject</b> காப்பிய இலக்கியமும் சிறுகதையும்	1	6	3	25	75	100	For B.Sc Mat
18UENG31	<b>Part – II English Subject</b> Exploring Language Through Literature-III	1	6	3	25	75	100	
18UPHC31 18UPHCP2	<b>Part-III Core Subject</b> Optics and Spectroscopy Major Physics Practical – II	1 -	4 2	4 -	25 -	75 -	100 -	
18UMTA31 18UCHA31 18UCHAP1	<b>Part-III Allied Subject</b> Allied Mathematics-III Allied Chemistry – I Organic Chemistry Allied Chemistry Practical – I Volumetric Analysis Practical	1 1 -	4 4 2	4 3 -	25 25 -	75 75 -	100 100 -	
18UPHN31	<b>Part-IV Non Major Elective</b> Physics for everyday life	1	2	2	25	75	100	
	<b>Total</b>	<b>6</b>	<b>30</b>	<b>19</b>	<b>150</b>	<b>450</b>	<b>600</b>	

<b>SEMESTER – IV</b>							
<b>Subject Code</b>	<b>Title of the Paper</b>	<b>No. of Courses</b>	<b>Hours/ Week</b>	<b>Credits</b>	<b>Maximum Marks</b>		
					<b>Int</b>	<b>Ext</b>	<b>Tot</b>
18UTAG41	<b>Part- I Tamil Subject</b> பழந்தமிழ் இலக்கியமும் புதினமும்	1	6	3	25	75	100
18UENG41	<b>Part – II English Subject</b> Exploring Language Through Literature-IV	1	6	3	25	75	100
18UPHC41	<b>Part-III Core Subject</b> Atomic Physics	1	4	4	25	75	100
18UPHCP2	Major Physics Practical – II	1	2	2	40	60	100
18UMTA41	<b>Part-III Allied Subject</b> Allied Mathematics – IV	1	4	4	25	75	100
18UCHA41	Allied Chemistry - II Inorganic Chemistry	1	4	3	25	75	100
18UCHAP1	Allied Chemistry Practical –I Volumetric Analysis Practical	1	2	2	40	60	100
18UPHN41	<b>Part IV –Non Major Elective</b> Physics of Electrical Appliances	1	2	2	25	75	100
18UEAG40 – 18UEAG49	<b>Part V- Extension Activity</b>	1	0	1	100	-	100
	<b>Total</b>	<b>9</b>	<b>30</b>	<b>24</b>	<b>330</b>	<b>570</b>	<b>900</b>

<b>SEMESTER – V</b>							
<b>Subject Code</b>	<b>Title of the Paper</b>	<b>No. of Courses</b>	<b>Hours /Week</b>	<b>Credits</b>	<b>Maximum Marks</b>		
					<b>Int</b>	<b>Ext</b>	<b>Total</b>
18UPHC51	<b>Part-III Core Subject</b> Classical and Statistical Mechanics	1	5	5	25	75	100
18UPHC52	Analog Electronics	1	5	5	25	75	100
<b>18UPHE51</b>	<b>Part III: Elective Subject</b> Nuclear Physics	1	4	4	25	75	100
<b>18UPHE52</b>	Condensed Matter Physics	1	4	4	25	75	100
<b>18UPHE53</b>	Astrophysics	1	4	4	25	75	100
18UPHCP3	Non-Electronics Practical	--	3	--	--	--	--
18UPHCP4	Electronics Practical	--	3	--	--	--	--
18UPHPR1	Project	--	2	--	--	--	--
18UCHA51	<b>Part-III Allied Subject</b> Allied Chemistry – III Physical Chemistry	1	4	3	25	75	100
18UCHAP2	Allied Chemistry Practical-II Organic Analysis	--	2	--	--	--	--
18UPHS51	<b>Part-IV Skill Subject</b> Gemology	1	2	2	25	75	100
	<b>Total</b>	<b>5</b>	<b>30</b>	<b>19</b>	<b>125</b>	<b>375</b>	<b>500</b>

<b>SEMESTER – VI</b>							
<b>Subject Code</b>	<b>Title of the Paper</b>	<b>No. of Courses</b>	<b>Hours/ Week</b>	<b>Credits</b>	<b>Maximum Marks</b>		
					<b>Int</b>	<b>Ext</b>	<b>Total</b>
18UPHC61	<b>Part-III Core Subject</b> Quantum Mechanics and Relativity	1	5	5	25	75	100
18UPHC62	Digital Electronics	1	5	5	25	75	100
<b>18UPHE61</b>	<b>Part III: Elective Subject</b> Nanophysics	1	4	4	25	75	100
<b>18UPHE62</b>	Medical Instrumentation	1	4	4	25	75	100
<b>18UPHE63</b>	Optoelectronics and Fibre optic communication	1	4	4	25	75	100
18UPHCP3	Non - Electronics Practical	1	3	5	40	60	100
18UPHCP4	Electronics Practical	1	3	6	40	60	100
18UPHPR1	Project	1	2	4	40	60	100
18UCHA61	<b>Part-III Allied Subject</b> Allied Chemistry – IV Applied and Analytical Chemistry	1	4	3	25	75	100
18UCHAP2	Allied Chemistry Practical-II Organic Analysis	1	2	2	40	60	100
18UPHS61	<b>Part-IV Skill Based</b> Basics in Microprocessors	1	2	2	25	75	100
	<b>Total</b>	<b>9</b>	<b>30</b>	<b>36</b>	<b>285</b>	<b>615</b>	<b>900</b>

# FIRST SEMESTER



**MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)**  
**DEPARTMENT OF PHYSICS**  
(For those who joined in 2018-2019 and after)

**Class : B.Sc., ( Physics)**  
**Semester : I**  
**Subject Code : 18UPHC11**

**Part III : Core**  
**Hours : 4**  
**Credits : 4**

**PROPERTIES OF MATTER, THERMODYNAMICS AND ACOUSTICS**

**Course Outcomes:**

**CO1: To enable the students to understand the basic concepts of properties of matter.**

**CO2: To enable the students to understand the basic concepts of heat.**

**CO3: To understand Ultrasonic waves and its applications Acoustics of Buildings and sound distribution system.**

**CO4: To develop the skill in the area of properties of matter and Thermodynamics.**

**Unit – I Elasticity**

Stress, Strain, Hooke's law – Different moduli of Elasticity – Young's modulus(E), Bulk modulus(K) and Rigidity modulus(G) – Poisson's ratio – Bending of beams – Expansion for Bending moment – Determination of Young's modulus by uniform and non-uniform bending – Couple per unit twist – Torsional oscillations of the body – Determination of Rigidity modulus by Torsional pendulum.

**Unit – II Surface Tension**

Definition – Unit and dimensions – Explanation of Surface Tension on Kinetic theory – Angle of contact – Pressure difference across a liquid surface – Excess pressure inside a liquid drop and soap bubble – Excess pressure inside a synclastic and anticlastic surface (curved liquid surface). Determination of Surface Tension by capillary rise method (Theory and experiment)

**Unit – III Viscosity**

Coefficient of viscosity – Stream line and Turbulent motion – Critical Velocity – Derivation of Poiseuille's formula – Poisson's method for determining coefficient of viscosity of a liquid – Equation of continuity. – Bernoulli's theorem – Venturimeter – Pitot's tube.

**Unit – IV Kinetic theory of gases and Thermodynamics**

Postulates of Kinetic theory of gases – Mean Free Path – Transport Phenomena – Expression for the coefficient of Viscosity, Diffusion and Thermal conductivity – Degrees of freedom – Boltzmann's law of equipartition of energy – calculation of  $\gamma$  for monoatomic and diatomic gases. Thermodynamics – Zeroth law, I, II and III law of Thermodynamics (statement only) – Entropy – Change of entropy in Carnot's cycle - Change of entropy in conversion of ice into steam.

## Unit-V Ultrasonics and Acoustics

Piezo electric effect – Production of Ultrasonic waves – Piezo electric and Magnetostriction method – Detection of Ultrasonic waves – (Quartz crystal and Kundt's tube method) – Properties – Determination of velocity of Ultrasonic waves in a liquid – Applications.

Acoustics of Buildings – Reverberation and reverberation time (Definition only) – Acoustics of buildings – Factors affecting the acoustics of buildings – Sound distribution in an auditorium.

### Text Book:

1.R. Murugesan, **Mechanics, Properties of Matter and Sound**, First edition, July 2016, Madurai.

Unit I - Section No 4.1-4.5, 4.7, 4.8, 4.10, 4.12, 4.13

Unit III - Section 5.1-5.7

2.R. Murugesan, **Mechanics and Relativity Properties of matter**, Practical Physics – I. First Edition August 2006, Madurai.

Unit II - Page No. 169-171, 174-179, 189-193

27 R. Murugesan, **THERMAL PHYSICS**, First edition June 2012, Madurai.

Unit IV - Section 6.1, 6.3-6.7, 6.9-6.11, 7.4-7.7

28 R. Murugesan, and Kiruthiga sivaprasath, **Properties of Matter and Acoustics**, First edition 2005, Reprint 2013, S.Chand, New Delhi.

Unit V - Section 5.1-5.9, 5.13-5.15

### Reference Books:

1. D.Halliday Resnick, Jearl Walker, **Principles of physics** (9<sup>th</sup> Edition), Wiley India Pvt Ltd.,
2. D.S Mathur, **Elements of Properties of matter**, S. Chand & Co., 2004
3. Brijlal & N. Subramanian, **Properties of matter**, S. Chand & Co., 2006.
4. D.Halliday Resnick, Jearl Walker, **Fundamental of physics**, Wiley India Pvt Ltd., 6<sup>th</sup> Edition
5. Brijlal, Subramaniam and P.S. Hemne, **Heat, Thermodynamics and Statistical Physics**, S. Chand & Co. 2004
6. D.S. Mathur, **Heat and Thermodynamics**, S. Chand & Co. 2002.
7. R. Murugesan, **Heat and Thermodynamics**, S. Chand & Co. 2004



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**DEPARTMENT OF PHYSICS**  
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**Class : B.Sc (Physics)**

**Semester : I & II**

**Subject Code : 18UPHCP1**

**Part III : Core**

**Hours : 02**

**Credits : -**

**MAJOR PHYSICS PRACTICAL-I**

**Course Outcomes:**

**CO1: To create the practical knowledge in basic physics experiments.**

**CO2: To understand the bending of beam, compound pendulum and torsion pendulum.**

**CO3: To understand current conduction in electrical circuits.**

**CO4: To enhance the skill in the physics experiments.**

**LIST OF EXPERIMENTS**

- |   |  |
|---|--|
| 1. Young's Modulus                        | - Uniform bending (Pin & Microscope)           |
| 2. Young's Modulus                        | - Non –Uniform bending – Optic lever           |
| 3. Young's Modulus                        | - Canti lever – Pin and Microscope             |
| 4. Sonometer                              | - laws of transverse vibration                 |
| 5. Surface tension                        | - by capillary rise method                     |
| 6. Rigidity Modulus                       | - Torsion Pendulum with loads                  |
| 7. Spectrometer                           | - Refractive index of a prism                  |
| 8. Moment of Inertia                      | - Torsion Pendulum                             |
| 9. Sonometer                              | -A.C Frequency                                 |
| 10. Melde's apparatus                     | - Frequency of tuning fork                     |
| 11. Thermal conductivity of Bad conductor | - Lee's disc                                   |
| 12. C.F Bridge                            | - Resistance and specific Resistance           |
| 13. Potentiometer                         | - Calibration of low range Voltmeter           |
| 14. Potentiometer                         | - Calibration of Ammeter                       |
| 15. Potentiometer                         | - Resistance and resistivity                   |
| 16. Compound Pendulum                     | - Determination of acceleration due to gravity |





**MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)**  
**DEPARTMENT OF PHYSICS**  
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**Class : B.Sc (Physics)**  
**Semester : I**  
**Sub code : 18UMTA11**

**Part III : Allied**  
**Hours : 06**  
**Credits : 04**

**ALLIED MATHEMATICS – I**

**Course Outcomes**

- CO1** To familiarize with the theory of equations.  
**CO2** To introduce transformation of equations.  
**CO3** To apply Newton's method and Horner's Method.  
**CO4** To provides the capability of solving the physical problems on skill development.

- Unit – I** Theory of Equation – An  $n^{\text{th}}$  degree equation has exactly  $n$  roots – Relation between the roots and the coefficients  
**Unit – II** Reciprocal Equations- Transformation of Equations  
**Unit – III** Finding the roots upto two decimals by Newton's method and Horner's Method  
**Unit – IV** Radius of curvature, Center of curvature of plane curves.  
**Unit - V** Integral calculus – Evaluation of Definite Integrals.

**Text Book:**

1. S.Arumugam, **Ancillary Mathematics Volume I**, New Gamma Publication, 1999 Reprint, Palayamkottai, 2006.

- Unit I - Chapter 1: Page No 1 to 26  
Unit II - Chapter 1 : Page No 27 to 40  
Unit III - Chapter 1: Page No 40 to 48  
Unit IV - Chapter 3: Page No 65 to 90  
Unit V - Chapter 3: Page No 91 to 113

**Reference Books :**

1. T.K .Manickavashagam Pillai and S.Narayanan, **Algebra, Volume I and II**, S.ViswanthanPrinters and Publishers Pvt Ltd, Chennai, 2009.  
2. T.Kmanickavashagampillai and S.Narayanan, **Trigonometry**, S.ViswanthanPrinters and Publishers Pvt Ltd, Chennai, 2009.



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**DEPARTMENT OF PHYSICS**  
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**Class : B.Sc (Physics)**

**Semester : I**

**Subject Code : 18UPHS11**

**Part IV : Skill**

**Hours : 02**

**Credits : 02**

**BASIC INSTRUMENTATIONS**

**Course Outcomes:**

**CO1: To enable the students to understand the basic concepts of instruments.**

**CO2: To understand the working principles of basic measuring instruments in physics.**

**CO3: To develop the skill of handling the basic instruments.**

**CO4: Knowledge in Basic Instrumentation gives the Job Opportunity.**

**Unit –I**

Telescope – Astronomical and Terrestrial – Microscope – Compound and Ultra,  
Spectrometer – Construction and application.

**Unit – II**

DC motors – Construction and working principle – AC Motors – 3 Phase Motors –  
Audio Frequency Oscillator (theory), Transformers (theory).

**Unit – III**

Electric Heater (theory) – Induction Heater (theory), Platinum Resistance  
thermometer – Centigrade and Fahrenheit Temperatures and their relation – Simple  
Problems.

**Unit – IV**

Permanent Magnet Moving Coil (PMMC)- Multimeter as ammeter, voltmeter, ohmmeter-  
Applications of Multimeter-Merits and Demerits of Multimeter

**Unit-V**

Cathode Ray Oscilloscope (CRO) -Cathode Ray Tube (CRT) -Display of Signal  
Waveform on CRO -Signal pattern on screen -Various controls of CRO- Applications of  
CRO

**Text Book:**

**Materials will be given by the department.**

**Reference Books:**

1. Brijlal & subramanyam– **A text book of optics S.Chand &co**
2. A.K Sawhney Dhanpat Rai & Co - **A course in electrical and electronic measurements and instrumentation**
3. R. Murugesan, **Electricity & Magnetism**, S.Chand & Co., 9<sup>th</sup> Revised Edition, New Delhi, 2011.



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**DEPARTMENT OF PHYSICS**  
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<b>Class</b>	<b>: B.Sc (Physics)</b>	<b>Part IV</b>	<b>: Skill</b>
<b>Semester</b>	<b>: I</b>	<b>Hours</b>	<b>: 02</b>
<b>Subject Code</b>	<b>: 18UPHS12</b>	<b>Credits</b>	<b>: 02</b>

**BASICS OF C PROGRAMMING**

**Course Outcomes:**

- CO1: Enable the students to understand the fundamentals of programming.**
- CO2: Empower the students to have strong knowledge in the building blocks of C.**
- CO3: Qualify the students with the basic knowledge of C programming.**
- CO4: To develop the skill in writing C-language program.**

**Unit-I:**

Programming fundamentals: Programming fundamentals – Program Development Life Cycle – Algorithm – Control structures – Flow chart – Pseudo code – Programming paradigms.

**Unit-II:**

Data types, variables and constants: Introduction – C standards – Learning programming language and natural language: An analogy – C Character set – identifiers and keywords – declaration statement - Data types – type qualifiers and type modifiers – difference between declaration and definition – data object, L-value and R-value – Variables and constants – Structure of a C program – Executing a C program.

**Unit-III:**

Operators and Expressions: Introduction – Expression – simple and compound expressions – classification of Operators – Combined precedence of all operators – reading strings from the keyboard – printing strings on the screen – unformatted functions.

**Unit-IV:**

Decision making statements: Introduction – statements– classification of statements – branching statements.

**Unit –V:**

Looping statements: Iteration statements. Storage class: Storage duration – life time of an object – storage classes.

**Text Book:**

1. Anita Goel, Ajay Mittal, **Computer Fundamentals and Programming in C**, Pearson, New Delhi, 2014.  
Unit – I : Page No 2.25 – 2.35.  
Unit – II : Page No 3.1 – 3.18.  
Unit – III :Page No 4.1 – 4.32.  
Unit – IV : Page No 5.1 – 5.22.  
Unit – V :Page No 5.23 – 5.33, 10.1 – 10.9.

**Reference Books:**

1. S.Ramasamy and P.Radhaganesan, **Programming in C (II Edition)**, Scitech Publication (India) Private Limited, Chennai, 2010.
2. Byron Gottfried, **Programming with C (III Edition)**, Tata McGraw Hill, New Delhi, 2012.



**MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)**  
**DEPARTMENT OF PHYSICS**  
 (For those who joined in 2018-2019 and after)

Class : B.Sc (Physics) Part IV : Mandatory  
 Semester : I Hours : 02  
 Subject Code : 18UEVG11 Credits : 02

**ENVIRONMENTAL STUDIES**

<b>COURSE OUTCOMES</b>	
<p><b>CO1:</b> To gain knowledge on the importance of environmental education and ecosystem.  <b>CO2:</b> To acquire knowledge about environmental pollution- sources, effects and control measures of environmental pollution  <b>CO3:</b> To understand the various energy sources, exploitation and need of alternate energy resources. Disaster management To acquire knowledge with respect to biodiversity, its threats and its conservation and appreciate the concept of interdependence  <b>CO4:</b> To make the student to understand the various pollution problems control mechanisms.</p>	
UNIT I	<p><b>Environment and Earth:</b> Environment – Meaning – Definition – Components of Environment – Types of Environment. Interference of man with the Environment. Need for Environmental Education. Earth – Formation and Evolution of Earth– Structure of Earth and its components – Atmosphere, Lithosphere, Hydrosphere and Biosphere.  <b>Natural Resources:</b> Renewable Resources and Non-Renewable Resources. Natural Resources and Associated Problems. Use and Exploitation of Forest, Water, Mineral, Food, Land and Energy Resources.</p>
UNIT II	<p><b>Ecology and Ecosystems:</b> Ecology – Meaning – Definition – Scope – Objectives – Subdivisions of Ecology.  <b>Ecosystem</b>–Concept – Structure – Functions – Energy Flow – Food Chain and Food Web – Examples of Ecosystems (Forest, Grassland, Desert, Aquatic).</p>
UNIT III	<p><b>Biodiversity:</b> Definition – Biodiversity at Global, National and Local Level. Values of Biodiversity – Threats to Biodiversity – Conservation of Biodiversity.  <b>Biodiversity of India:</b>Biogeographical Distribution – Hotspots of Indian Biodiversity – National Biodiversity Conservation Board and Its functions. Endangered and Endemic Species of India</p>
UNIT IV	<p><b>Pollution Issues:</b> Definition – Causes – Effects and Control Measures of Air, Water, Soil, Marine, Noise, Thermal and Nuclear Pollutions.  <b>Global Issues:</b> Global Warming and Ozone Layer Depletion. Future plans of Global Environmental Protection Organisations.</p>
UNIT V	<p><b>Sustainable Development:</b>Key aspects of Sustainable Development – Strategies for Sustainable Development – Agriculture – Organic farming – Irrigation – Water Harvesting – Water Recycling – Cyber Waste and Management.  <b>Disaster Management:</b>Meaning – Types of Disasters – Flood and Drought – Earth quake and Tsunami – Landslides and Avalanches – Cyclones and Hurricanes – Preventions and Consequences. Management of Disasters -</p>

**Text Book:**

Study Material for **Environmental Studies**, Mannar Thirumalai Naicker College, Pasumalai, Madurai – 625 004.

**Reference Books:**

1. Study Material for **Environmental Studies**, Publications Division, Madurai Kamaraj University, Madurai – 625 021.
2. R.C. Sharma and Gurbir Sangha, **Environmental Studies**, Kalyani Publishers, 1, Mahalakshmi Street, T.Nagar, Chennai – 600 017.
3. Radha, **Environmental Studies for Undergraduate Courses of all Branches of Higher Education, (Based on UGC Syllabus)**, Prasanna Publishers & Distributors, Old No. 20, Krishnappa Street, (Near Santhosh Mahal), Chepak, Chennai – 600 005.
4. S.N.Tripathy and Sunakar Panda, **Fundamentals of Environmental Studies**, Vrinda Publications (P) Ltd. B-5, Ashish Complex, (opp. To Ahicon Public School), MayurVihar, Phase-1, Delhi– 110 091.
5. G.Rajah, **Environmental Studies for All UG Courses, (Based on UGC Syllabus)**, Margham Publications, 24, Rameswaram Road, T.Nagar, Chennai – 600 017.

# SECOND SEMESTER





**MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)**  
**DEPARTMENT OF PHYSICS**  
(For those who joined in 2018-2019 and after)

**Class : B.Sc (Physics)**

**Semester : II**

**Subject Code : 18UPHC21**

**Part III : Core**

**Hours : 04**

**Credits : 04**

**ELECTRICITY AND MAGNETISM**

**Course Outcomes:**

**CO1: To enable the students to understand the basic concepts of electricity and magnetism.**

**CO2: To understand the current conduction.**

**CO3: To understand the magnetic field due to electric current.**

**CO4: To improve the skill in the area of current conduction and electromagnetism.**

**Unit I:**

Electric field and flux – Gauss law statement and explanation – Applications of Gauss law – Electric field due to a point charge – Electric field due to charged spherical conductor at a point outside, inside & on the surface of the sphere – Coulomb's theorem – Electric potential – Relation between electric potential & electric field – Potential due to an electric dipole- Electric potential energy.

**Unit II:**

Capacitance – Principle of capacitor – Effect of a Dielectric in a capacitor – Expression for the capacitance of cylindrical capacitor, parallel plate capacitor (i)With & Without dielectric, (ii)Partially filled with dielectric – Energy stored in a charged capacitor – Loss of energy on sharing of charges between two capacitors – Types of capacitors – Uses of capacitors.

**Unit III:**

Kirchhoff's laws – Application of Kirchhoff's laws to Wheatstone's network – Carey Foster's Bridge – Determination of the resistance and resistivity of the given wire with the necessary theory – Principle of Potentiometer – Calibration of ammeter and voltmeter (low range only) – Seeback effect – Peltier effect – Thomson effect (explanation alone).

**Unit IV:**

The Magnetic field Intensity (H) – Magnetic Induction (B) – Magnetic flux ( $\phi$ ) – Biot-Savart's law – It's applications –Magnetic induction at a point on the axis of a circular coil carrying current – Magnetic induction at a point on the axis of a solenoid – Moving coil ballistic galvanometer – Principle, construction and theory – Difference between Dead beat & Ballistic galvanometer – Current and voltage sensitivities of a moving coil galvanometer.

**Unit V:**

Faraday's laws of electromagnetic induction – Self inductance of a long solenoid – Mutual inductance between two coaxial solenoids – Coefficient of coupling – Three magnetic vectors – magnetic induction (B), magnetic intensity (H) & magnetization(M) – Dia, Para, Ferro & Ferri magnetism – Ferrites - Magnetic susceptibility – Guoy's method – Hysteresis – Explanation & Importance of hysteresis curves.

**Text Book**

- a. R. Murugesan, **Electricity & Magnetism**, S.Chand & Co., 9<sup>th</sup> Revised Edition, New Delhi, 2011.

Unit – I	: 2.1 – 2.3, 2.6, 2.11, 3.1, 3.2, 3.3, 3.5
Unit – II	: 4.1, 4.4, 4.5, 4.6, 4.7, 4.9, 4.11, 4.13
Unit – III	: 6.6, 7.1, 7.2, 8.1, 8.3, 8.4, 8.5, 8.7
Unit – IV	: 10.1, 10.2, 10.4, 10.6, 10.11, 10.12
Unit – V	: 11.1, 11.4, 11.8, 11.10, 15.1 – 15.9, 15.17

**Reference Books:**

1. Narayanamoorthy & Nagarathinam, **Electricity & Magnetism**, National Publishing Co., New Delhi, 1997.
2. Sehgal, Chopra & Sehgal, **Electricity & Magnetism**, Sultan Chand & Sons, New Delhi, 1998.
3. Brijlal & Subramaniam **Electricity & Magnetism**, S.Chand & Co. 20<sup>th</sup> Revised Edition, New Delhi, 2007.



**MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)**  
**DEPARTMENT OF PHYSICS**  
(For those who joined in 2018-2019 and after)

**Class : B.Sc (Physics)**

**Part III : Core**

**Semester : I & II**

**Hours : 02**

**Subject Code : 18UPHCP1**

**Credits : 02**

**MAJOR PHYSICS PRACTICAL-I**

**Course Outcomes:**

**CO1: To create the practical knowledge in basic physics experiments.**

**CO2: To understand the bending of beam, compound pendulum and torsion pendulum.**

**CO3: To understand current conduction in electrical circuits.**

**CO4: To enhance the skill in the physics experiments.**

**LIST OF EXPERIMENTS**

- |   |  |
|---|--|
| 1. Young's Modulus                        | - Uniform bending (Pin & Microscope)           |
| 2. Young's Modulus                        | - Non –Uniform bending – Optic lever           |
| 3. Young's Modulus                        | - Canti lever – Pin and Microscope             |
| 4. Sonometer                              | - laws of transverse vibration                 |
| 5. Surface tension                        | - by capillary rise method                     |
| 6. Rigidity Modulus                       | - Torsion Pendulum with loads                  |
| 7. Spectrometer                           | - Refractive index of a prism                  |
| 8. Moment of Inertia                      | - Torsion Pendulum                             |
| 9. Sonometer                              | -A.C Frequency                                 |
| 10. Melde's apparatus                     | - Frequency of tuning fork                     |
| 11. Thermal conductivity of Bad conductor | - Lee's disc                                   |
| 12. C.F Bridge                            | - Resistance and specific Resistance           |
| 13. Potentiometer                         | - Calibration of low range Voltmeter           |
| 14. Potentiometer                         | - Calibration of Ammeter                       |
| 15. Potentiometer                         | - Resistance and resistivity                   |
| 16. Compound Pendulum                     | - Determination of acceleration due to gravity |



**MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)**  
**DEPARTMENT OF PHYSICS**  
(For those who joined in 2018-2019 and after)

**Class : B.Sc (Physics)**  
**Semester : II**  
**Sub code : 18UMTA21**

**Part III : Allied**  
**Hours : 06**  
**Credits : 04**

**ALLIED MATHEMATICS –II**

**Course Outcomes**

**CO1** To learn and understand about Matrices and straight lines.

**CO2** To introduce the basic concept of sets.

**CO3** To familiarize with interpolation.

**CO4** To provide the capability of solving the physical problems on skill development

- Unit – I** Theory of sets- Introduction- The concept of a set- Set Inclusion- Union of sets- Intersection of sets
- Unit –II** Difference of sets- Complement – Symmetric Difference of Two sets- Cartesian product of sets.
- Unit –III** Curve Fitting – Correlations-Rank Correlations
- Unit –IV** Lagranges and Newton’s Method –Interpolation.
- Unit – V** Matrices – Rank of a Matrix – Consistency of equation- Characteristic Equation and Cayley- Hamilton theorem.

**Text Books:**

1. S.Arumugam and A.T.Isacc , **Modern Algebra**, Scitech Publication, Chennai, Reprint, 2003.  
Unit I - Chapter 1 : Section 1.0 to 1.4  
Unit II - Chapter 1 : Section 1.5 to 1.8  
Unit V - Chapter 7 : Section 7.5 , 7.6, 7.7
2. S.Arumugam and A.T.Isacc, Statistics, New Gomma Publications House , Palayamkottai, Reprint 2013.  
Unit III - Chapter 5 : Section 5.0,5.1  
Chapter 6 : Section 6.1,6.2  
Unit IV - Chapter 7 : Section 7.2,7.3

**Reference Books :**

1. Durai Pandian, Laxmi Durai Pandian ,Udayabaskaran, **Algebra and Calculus of Vectors**, S.Viswanthan Printers and Publishers Pvt Ltd, Chennai,1980.
2. A.R.Vasishtha, **Matrices**, Krishna Prakashan and Publication Media Pvt Ltd, 45<sup>th</sup> Edition, Meerut, 2014.
3. S.C.Gupta ,V.K.Kapoor,**Fundamental of Mathematical statistics**, Sultan Chand and Sons Educational Publishers, New Delhi,2009.
4. S.P.Gupta, **Statistical Methods** , Sultan Chand and Sons Educational Publishers, New Delhi,2014.



**MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)**  
**DEPARTMENT OF PHYSICS**  
(For those who joined in 2018-2019 and after)

**Class : B.Sc (Physics)**

**Semester : II**

**Subject Code : 18UPHS21**

**Part IV : Skill**

**Hours : 02**

**Credits : 02**

**BASIC PHOTOGRAPHY**

**Course Outcomes:**

**CO1:** Understand the different source of light.

**CO2:** Learn to take pictures in a controlled light environment.

**CO3:** Learn about shooting a variety of products.

**CO4:** Knowledge in Basic photography gives the job opportunity.

**Unit:I**

Types of cameras for photograph– Compact digital camera – Digital SLR camera– Mirror less camera – Action camera – 360 camera –Film camera

**Unit: II**

Exposure- Setting aperture-Altering the shutter speed understanding ISO – Depth of field – Portrait photography-Nature photography- Night photography.

**Unit: III**

Lenses- Types of lenses –Normal, telephoto, zoom, wide angle, fish eye and close up lenses – Lines,curves,and shapes in photographs- Basics of photography - Perspective, proportion and composition.

**Unit: IV**

Lighting-Light direction resource – External light metering resource –Exposure metering resource – Partial and spot metering resource – Flash.

**Unit: V**

Photo editing-Morphing-Background removing-Useful retouching tools- Cropping-Levels and curves- Contrast control- Hue and saturation- Red eye – Cloning- Printing and saving.

**Text book:**

Materials will be given by the department.

**Reference Books:-**

1. How to use your 35mm camera – Minolta.
2. Michael J. Langford **Basic photography** , Focal Press, London, 4<sup>th</sup> edition.
3. Nirmal Pasricha, **How to become an expert in Photography**,P.A.D.U Publications 1996
4. Harry C.Box, **Set Lighting technician's handbook**



**MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)**  
**DEPARTMENT OF PHYSICS**  
(For those who joined in 2018-2019 and after)

<b>Class</b>	<b>: B.Sc (Physics)</b>	<b>Part IV</b>	<b>: Skill</b>
<b>Semester</b>	<b>: II</b>	<b>Hours</b>	<b>: 02</b>
<b>Subject Code</b>	<b>: 18UPHSP1</b>	<b>Credits</b>	<b>: 02</b>

**PROGRAMMING IN C – Lab**

**Course Outcomes:**

**CO1: Learn the fundamentals of programming concepts.**

**CO2: Develop the students to write simple programs in C.**

**CO3: Practice the students using control statements.**

**CO4: To practice the C- Language skill in the lab.**

Simple C programming in Data types, Expression Evaluation and Conditional Statements:

1. Write a C program to find area and circumference of various shapes like square, rectangle, triangle, circle and sphere etc.
2. Write a C program to convert decimal value into octal value.
3. Write a C program to find the exponent of the given number.
4. Write a C program for swapping two variables without using temp and with using temp variable.
5. Write a C program to convert Fahrenheit into Celsius Values.
6. Write a C program to print the size of data types.
7. Write a C program to print multiplication table.
8. Write a C program to find factorial value of the given number.
9. Write a C program whether the given number is odd or even.
10. Write a C program whether the given number is positive or negative
11. Write a C program to find the given number is prime or not.
12. Write a C program to find the given number is Armstrong or not
13. Write a C program to find the given number is perfect or not
14. Write a C program to find the sum of digits of the given value.
15. Write a C program to find the largest and smallest of three numbers.
16. Write a C program to find whether a year is leap or not.
17. Write a C program to print Pascal triangle.
18. Write a simple menu driven Calculator program using switch statement.
19. Write a C program for Electricity Bill preparation.
20. Write a C program to print student mark sheet.



**MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)**  
**DEPARTMENT OF PHYSICS**  
 (For those who joined in 2018-2019 and after)

**Class : B.Sc (Physics)**  
**Semester : II**  
**Subject Code : 18UVLG21**

**Part IV : Mandatory**  
**Hours : 02**  
**Credits : 02**

**VALUE EDUCATION**

<b>COURSE OUTCOMES</b>	
<p><b>CO1:</b>Clarifying the meaning and concept of value – value education.</p> <p><b>CO2:</b>To inspire <b>students</b> to develop their personality and social <b>values</b> based on the principles of human <b>values</b>.</p> <p><b>CO3:</b>Developing sense of Love, Peace and Brotherhood at Local, national and international levels.</p> <p><b>CO4:</b>To enable the students to understand the social realities and to inculcate an essential value system towards building a health society</p>	
UNIT I	<p><b>Values and The Individual:</b> Values – Meaning – Definition – Importance – Classification of Values, Value Education – Meaning – Need for Value Education. Values and the Individual – Self-Discipline – Meaning – Tips to Improve Self-Discipline. Self-Confidence – Meaning – Tips to Improve Self-Confidence. Empathy – Meaning – Role of Empathy in motivating Values. Compassion – Role of Compassion in motivating Values. Forgiveness – Meaning – Role of Forgiveness in motivating Values. Honesty – Meaning – Role of Honesty in motivating Values. Courage – Meaning – Role of Courage in motivating Values.</p>
UNIT II	<p><b>Religions and Communal Harmony:</b> Religions – Meaning – Major Religions in India – Hinduism – Values in Hinduism. Christianity – Values in Christianity. Islam – Values in Islam. Buddhism – Values in Buddhism. Jainism – Values in Jainism. Sikhism – Values in Sikhism. Need for Religious Harmony in India. Caste System in India – Need for Communal Harmony in India. Social Justice – Meaning – Factors Responsible for Social Justice.</p>
UNIT III	<p><b>Society and Social Issues:</b> Society – Meaning – Values in Indian Society. Democracy – Meaning – Values in Indian Democracy. Secularism – Meaning – Values in Indian Secularism. Socialism – meaning – Values in Socialism. Social Issues – Alcoholism – Drugs – Poverty – Unemployment.</p>



UNIT IV	:	<b>Human Rights and Marginalised People:</b> Human Rights – Meaning – Problem of Violation of Human Rights in India – Authorities available under the Protection of Human Rights Act in India. Marginalised People like Women, Children, Dalits, Minorities, Physically Challenged – Concept – Rights – Challenges. Transgender – Meaning – Issues.
UNIT V	:	<b>Social Institutions in Value Formation:</b> Social Institutions – Meaning – Important Social Institutions. Family – Meaning – Role of Families in Value Formation. Role of Press & Mass Media in Value Formation – Role of Social Activists – Meaning Contribution to Society – Challenges.

**Text Book:**

1. Text Module for **Value Education**, Mannar Thirumalai Naicker College, Pasumalai, Madurai – 625 004

**Reference Books:**

1. Text Module for **Value Education**, Publications Division, Madurai Kamaraj University, Madurai – 625 021.
2. N.S.Raghunathan, **Value Education**, Margham Publications, 24, Rameswaram Road, T.Ngar, Chennai – 600 017.
3. Dr.P.Saravanan, and P.Andichamy, **Value Education**, Merit India Publications, (Educational Publishers), 5, Pudumandapam, Madurai-625001.

# THIRD SEMESTER



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)

DEPARTMENT OF PHYSICS

(For those who joined in 2018-2019 and after)

Programme	: UG	Part III	: Core
Semester	: III	Hours per week	: 04
Subject Code	: 18UPHC31	Credit	: 04

## OPTICS AND SPECTROSCOPY

### Course Outcomes

**CO1:** To understand the concepts in optics

**CO2:** To gain knowledge in geometrical and physical optics and Photoelectric effect and its applications.

**CO3:** To analyse the types of polarising material.

**CO4:** To evaluate the optical instruments.

### Unit I - Geometrical optics

Equivalent focal length of a system of two thin lenses in contact- separated by a distance -Aberrations in lenses- chromatic aberration (longitudinal and lateral) - achromatic combination (lenses in contact and separated by a Finite distance). Spherical aberration – minimizing spherical aberration - crossed lens – separation by a distance- Aplanatic lens.

### Unit II - Physical optics – Interference

Coherent sources-Theory of Interference fringes – Colours of thin films (Interference by Reflected light only) -Michelson’s interferometer-applications- Determination of wave length-Resolution of spectral lines-Refractive index of a gas –Fabry-Perot Interferometer-sharpness of fringes –Resolving power - Types of interference fringes – Theory of Holography and its applications.

### Unit III - Diffraction

Fresnel and Fraunhofer diffraction - Zone plate -Theory-comparison with convex lens – Fraunhofer diffraction at a circular aperture - Fresnel Diffraction at a narrow rectangular aperture (Narrow slit) - concave reflection grating - Eagle mounting - Resolving power of optical instruments - Telescope, grating, prism.

### Unit IV – Polarization

Double refraction - Huygens’s theory of double refraction - Nicol prism – Theory of Production and analysis of plane, circularly and elliptically polarized light - QWP-HWP – Production and Detection of Plane, Circularly and Elliptically Polarised Light - Optical activity- Biot’s Laws – Fresnel’s theory of optical rotation – Experimental verification of Fresnel’s theory –Laurent’s Half Shade Polarimeter – Determination of Specific Rotation of Sugar Solution- Polaroids and its uses.

## Unit V – Spectroscopy

Infra red Spectroscopy and Ultraviolet Spectroscopy – Sources – detection – applications – Raman effect – experimental study – Quantum theory of Raman effect - Applications. Doppler Effect in light and its applications.

### Text Books:

Murugesan.R - Optics and Spectroscopy, S.Chand & company Ltd. VII Edition /2010, New Delhi.

Unit I: Chapter 1(Section 1.5, 1.6, 1.8 to 1.15)

Unit II: Chapter 2(Section 2.1,2.2, 2.3, 2.5 to 2.13)

Unit III: Chapter 3(Section 3.1 to 3.7, 3.12 to 3.16)

Unit IV: Chapter 4(Section 4.5 to 4.21)

Unit V: Chapter 5(Section 5.1 to 5.9)

### Reference Books:

1. Kakani & Bhandari Sultan – **Optics & Spectroscopy**, Chand & Sons-New Delhi.
2. Brijlal & Subramanyam. – **A text book of optics**, S.Chand & co
3. Sharma.B.K – **Spectroscopy**, GOEL Publishing House, Meerut 2006.



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)

DEPARTMENT OF PHYSICS

(For those who joined in 2018-2019 and after)

Programme : UG	Part III	: Core
Semester : III & IV	Hours per week	: 02
Subject Code : 18UPHCP2	Credit	: 02

### MAJOR PHYSICS PRACTICAL – II

#### Course Outcomes

**CO1:** To develop experimental knowledge by handling various apparatus

**CO2:** To know the various components and its important

**CO3:** To know the circuit connections and functioning of experiments.

**CO4:** To analyse various types of measuring instruments.

Any 14 experiments.

1. Determination of  $M$  and  $B_H$  - Tan C method
2. Laurent's Half Shade Polarimeter - Specific rotatory power
3. Determination of  $M$  - Axial coil
4. Potentiometer - Temp. Coefficient of coil
5. Potentiometer - Comparison of EMF's
6. Table Galvanometer - Figure of merit
7. Spot Galvanometer - Figure of merit
8. Spot Galvanometer - Charge sensitiveness
9. Owen's Bridge - Determination of  $L$
10. De sauty's Bridge -  $C_1/C_2$
- 11 Spot Galvanometer - Comparison of EMF's
12. Spot Galvanometer - Comparison of capacities
13. Refractive Index of the material - Spectrometer
14. Grating -  $N$  and  $\lambda$
15. Air Wedge - Thickness of a wire
16. Newton's Rings - Radius and wavelength measurements



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)

DEPARTMENT OF MATHEMATICS

(For those who joined in 2018-2019 and after)

Programme : Physics  
Semester : III  
Subject Code : 18UMTA31

Part III : Allied  
Hours per week : 04  
Credit : 04

### ALLIED MATHEMATICS – III

#### Course Outcomes:

**CO1:** To develop the skills in formulation of LPP.

**CO2:** To learn about different techniques on solving LPP.

**CO3:** To understand Transportation and Assignment problems.

**CO4:** To provide the capability of solving the Commercial mathematical problems for employability.

#### Unit – I

Nature and Features of O.R- Modelling of O.R – General solution methods for O.R models- Scientific method in O.R- Applications of O.R

#### Unit– II

Linear Programming Problems- Mathematical Formulation of a LPP — Graphical solution of a LPP- Slack and Surplus variables.

#### Unit –III

Simplex method of solving a LPP – Concept of Duality– Formation of Dual LPP – the dual of the dual is the primal (Only Problems).

#### Unit –IV

Transportation Problem –Finding Initial feasible solution by North West Corner method and Vogel’s Approximation method – Optimal solution of Transportation problem.

#### Unit– V

Assignment problem – Solution of Assignment problems – Travelling sales man problem.

#### Text Books:

1. Kanti Swarup, Manmohan and Gupta, **Operations Research**, Sultan Chand Publications, 2006, New Delhi.

Unit I – From text book 1: Chapter 1

2. Dr. Arumugam. S and Isaac, **Topics in Operations Research** (Linear Programming) New Gamma Publishing House, June 2012, Palayamkottai.
- |          |   |   |
|----------|---|---|
| Unit II  | – | From text book 1: Chapter 3 : Sections : 3.1 to 3.4 |
| Unit III | – | From text book 2: Chapter 3:Sections: 3.5 to 3.10   |
| Unit IV  | – | From text book 2: Chapter 4 : Sections 4.1 and 4.2  |
| Unit V   | – | From text book 2: Chapter 5 : Sections 5.1 and 5.2  |

**Reference books:**

1. Gupta. R.K, **Operations Research**, Krishna Prakash Mandir, Second Edition, 1988, Meerut.
2. Kanti Swarup , Gupta. P.K and Man Mohan, **Introduction to Operations Research**, Sultan Chand and sons Publications, August 1997, New Delhi.
3. Kalavathy. S, **Operations Research** (2<sup>nd</sup> edition), Vikas Publishing House, 2002, New Delhi.



**MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)**  
**DEPARTMENT OF CHEMISTRY**  
(For those who joined in 2018-2019 and after)

<b>Programme</b>	<b>: B.Sc (Physics)</b>	<b>Part III</b>	<b>: Allied</b>
<b>Semester</b>	<b>: III</b>	<b>Hours per week</b>	<b>: 04</b>
<b>Sub code</b>	<b>: 18UCHA31</b>	<b>Credit</b>	<b>: 03</b>

**Allied Chemistry – I**  
**ORGANIC CHEMISTRY**

**Course Outcomes**

- CO1:** To gain knowledge about carbohydrates  
**CO2:** To gain the basic knowledge of halogen compounds and dyes  
**CO3:** To understand about the types of organic reactions  
**CO4:** To gain knowledge in stereoisomerism.

**Unit – I CARBOHYDRATES**

1. Carbohydrates – Definition – Classification – Mono saccharides – Properties and uses of glucose and fructose – Structure of glucose and fructose - Haworth structure – muta rotation – Conversion of glucose into fructose and vice versa.
2. Disaccharides – Sucrose – manufacture – Properties and uses – Structure – Distinction between glucose and fructose.
3. Poly saccharides – Starch and Cellulose ( Structure only) –  $\alpha$ -amylose –  $\beta$ -amylose – difference between these two.

**Unit – II HALOGEN COMPOUNDS**

1. Aliphatic halogen compounds – preparation properties and uses of ethyl iodide, chloroform, iodoform and carbon tetrachloride.
2. Aromatic halogen compounds – preparation properties and uses of benzoyl chloride and chloro benzene.
3. Mechanism of aliphatic substitution  $S_N^1$ ,  $S_N^2$  illustration with examples – differences – Saytzeff and Hofmann rules.

**Unit – III DYES**

Dyes – Definition – theory of colour and constitution – classification of dyes according to the structure and their mode of applications

1. Azodyes: Preparation and uses of methyl orange and Bismark brown.
2. Triphenyl methane dyes: Preparation and uses of malachite green and crystal violet
3. Vat dyes: Preparation and uses of Indigo only
4. Phthalein dyes: Preparation and uses of phenophthalein only



### Unit – IV TYPES OF ORGANIC REACTIONS

1. Detection and estimation of nitrogen and halogens in organic compounds – empirical formula – molecular formula – structural formula – calculation of empirical formula and molecular formula from percentage composition.
2. Types of reactions: Substitution, addition, elimination – rearrangement and polymerization – Illustration with examples – Nucleophiles – Electrophiles: definition types and examples specific reactions involving these.

### Unit – V STEREOISOMERISM

1. Stereoisomerism – Chiral centre, optical activity of compounds containing one or two chiral centres, R – S notation – diastereoisomers – racemisation – resolution.
2. Geometrical isomerism of maleic and fumaric acids – E – Z notation of geometrical isomers.

#### Text Book:

Soni.P.L, Text Book of Organic Chemistry, New Delhi (2008)

#### Reference Books:

1. Bahl.B.S and Arun Bahl S. Chand, Advanced Organic Chemistry (2012), New Delhi.
2. Mehta.B and Mehta.M, Organic Chemistry (E.E. Edition (2010), New Delhi.
3. P.L. Soni and HM Chawla, Organic Chemistry 29<sup>th</sup> Edition, Sultan and Chand sons, (2007), New Delhi.



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)

DEPARTMENT OF CHEMISTRY

(For those who joined in 2018-2019 and after)

Programme	: B.Sc (Physics)	Part III	: Allied
Semester	: III & IV	Hours per week	: 02
Sub code	: 18UCHAP1	Credit	: 02

**Allied Chemistry Practical – I**  
**VOLUMETRIC ANALYSIS (Practical)**

**Course Outcomes:**

**CO1:** To enable the students to develop skill in Acidimetry.

**CO2:** To gain know in Alkalimetry.

**CO3:** To gain knowledge in Permanganometry.

**CO4:** To know about the knowledge of Iodimetry.

1. Estimation of Sodium Hydroxide  
( $\text{Na}_2\text{CO}_3$  X HCl X NaOH)
2. Estimation of Hydrochloric Acid  
( $\text{H}_2\text{C}_2\text{O}_4$  X NaOH X HCl)
3. Estimation of Oxalic Acid  
(FAS /  $\text{FeSO}_4$  X  $\text{KMnO}_4$  X  $\text{H}_2\text{C}_2\text{O}_4$ )
4. Estimation of Ferrous Sulphate  
( $\text{H}_2\text{C}_2\text{O}_4$  X  $\text{KMnO}_4$  X  $\text{FeSO}_4$ )
5. Estimation of  $\text{KMnO}_4$   
( $\text{K}_2\text{Cr}_2\text{O}_7$  X FAS X  $\text{KMnO}_4$ )
6. Estimation of Sodium Hydroxide  
( $\text{KMnO}_4$  X  $\text{H}_2\text{C}_2\text{O}_4$  X NaOH)
7. Estimation of  $\text{K}_2\text{Cr}_2\text{O}_7$   
( $\text{KMnO}_4$  X FAS X  $\text{K}_2\text{Cr}_2\text{O}_7$ )
8. Estimation of  $\text{Na}_2\text{CO}_3$   
( $\text{NaHCO}_3$  X HCl X  $\text{Na}_2\text{CO}_3$ )
9. Estimation of Iodine  
( $\text{KMnO}_4$  x Thio x Iodine)

**INTERNAL = 40 MARKS**

**EXTERNAL = 60 MARKS**



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)

DEPARTMENT OF PHYSICS

(For those who joined in 2018-2019 and after)

Programme : UG	Part IV	: NME
Semester : III	Hours per week	: 02
Subject Code : 18UPHN31	Credit	: 02

### PHYSICS FOR EVERYDAY LIFE

#### Course Outcomes

**CO1:** To enable the students to understand the basic concepts of Physics

**CO2:** To gain Knowledge about different types of energy

**CO3:** To study the concept of light and its applications

**CO4:** To analyse the light properties

#### Unit – I Physical Quantities

SI units - Distance - Displacement – Speed – Velocity - Uniform and variable velocity  
- Acceleration and Retardation - Force – Translational motion and rotational motion –  
Centrifugal and Centripetal force with examples.

#### Unit – II Light

Reflection – Refraction – Lenses – Concave and Convex lens - Difference between  
concave and convex lenses - Focal length – Power of a lens – Application of lenses – Prism -  
Scattering of light – Applications of scattering.

#### Unit – III Sound

Sound waves – Ultrasonic and infrasonic (definition only) – Amplitude, time period,  
frequency and wavelength (definition only) – Properties of the sound waves - Reflection of  
sound waves – Echo – Use of Echoes by sonar - Use of Echoes in Medical field.

#### Unit – IV Heat

Concept of heat – Unit of heat – Concept of temperature – Unit of temperature –  
Difference between Heat and temperature – Thermometer – Liquid thermometer – Celsius  
thermometer – Fahrenheit thermometer – Clinical thermometer – Factors Affecting the  
Quantity of Heat.

#### Unit – V Energy

Energy – Potential, mechanical, solar, heat, light, chemical, electrical, sound and wind  
energy - Conversion - Mechanical energy to electrical energy - Electrical energy to heat  
energy - Electrical energy to sound energy - Electrical energy to light energy - Electrical  
energy to chemical energy - Chemical energy to mechanical energy.

### **Text Book**

Material will be compiled by the Department

### **Reference Books**

1. Mathur. D.S, **Mechanics** S. Chand & Co.2002
2. Haliday.D, Resnick and Walker.J, **Fundamental of physics** 6<sup>th</sup> Edition
3. Kakani & Bhandari Sultan - **Optics & Spectroscopy**, Chand & Sons- New Delhi.
4. Brijlal & subramanyam.– **A text book of optics**, S.Chand &co
5. Narayanamoorthy & Nagarathinam -**Electricity & Magnetism** – National Publishing Co. 1997

# FOURTH SEMESTER



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)

DEPARTMENT OF PHYSICS

(For those who joined in 2018-2019 and after)

Programme : UG	Part III	: Core
Semester : IV	Hours per week	: 4
Subject Code : 18UPHC41	Credit	: 4

### ATOMIC PHYSICS

#### Course Outcomes

**CO1:** To understand the atomic structure and different energy levels

**CO2:** To understand the splitting of spectral lines and X – ray diffraction

**CO3:** To understand the photoelectric effect and black body radiation

**CO4:** To study the dual nature of material particles

#### Unit I – Atom Models

Introduction – Rutherford’s experiments on scattering of  $\alpha$ -particles – Bohr atom model (no derivation) – application of Bohr’s theory – critical potentials – atomic excitation – Sommerfeld’s relativistic atom model – elliptical orbits – relativistic variation of atomic masses – application to fine structure of spectral lines – vector atom model – spatial quantization – spinning electron hypothesis.

#### Unit II – Atomic Structure

Quantum numbers – coupling schemes – The Pauli’s exclusion principle – electron configurations – magnetic dipole moment due to orbital and spin motion of the electron – Stern and Gerlach experiment – spin-orbit coupling – optical spectra – Zeeman effect – Larmor’s theorem – stark effect – electronic structure of atom – quantum mechanical explanation of the normal Zeeman effect – anomalous Zeeman effect – Paschen-back effect – its types – normal Zeeman effect – theory and experiment.

#### Unit III – X-ray Diffraction

X rays – production – Coolidge tube – spacing between three dimensional lattice planes – Bragg’s law – Bragg’s X-ray spectrometer – The powder crystal method – (a) The Laue method – (b) Rotating-crystal method – X-ray spectra – Characteristics X-rays spectrum – Moseley’s law and its importance – Compton effect – Theory and experiment.

#### Unit IV – Photo Electric Effect

Introduction – Experimental investigation on the photoelectric effect – Laws of photo electric effect – Einstein’s photo electric equation – Photoelectric cells – photo-emissive cell – photo-voltaic cell – photoconductive cell – Planck’s theory of black body radiation – Theory and experiment.

## Unit V – Dual Nature of Matter Particles

Introduction – De Broglie’s hypothesis of matter waves - De Broglie’s wave length – phase velocity (or wave velocity) of De Broglie’s waves – Expression for group velocity – relation between them – G.P.Thomson experiment of study of matter waves – Heisenberg’s uncertainty principle with the illustration of diffraction of electron through a single slit.

### Text book:

1. Murugesan.R, Er.Kiruthiga Sivaprasath, **Modern Physics**, S.Chand, 17<sup>th</sup> Revised Edition, 2014, New Delhi.

UNIT I: Chapter 6 (6.1, 6.2, 6.4, 6.8, 6.9, 6.11, 6.12).

UNIT II: Chapter 6 (6.13, 6.14, 6.15, 6.17, 6.18, 6.19, 6.20, 6.21, 6.22, 6.23, 6.24, 6.25, 6.26, 6.27, 6.28).

UNIT III: Chapter 7 (7.1, 7.2, 7.3, 7.6, 7.7, 7.8, 7.9(a & b), 7.11, 7.12, 7.13, 7.14)

UNIT IV: Chapter 8 (8.1, 8.4, 8.5, 8.6(i, ii & iii), Chapter 9

UNIT V: Chapter 11(11.1,11.2,11.3,11.4)

### Reference Books:

1. Rajam.J.B, Atomic **Physics**, S.Chand and Co, 2004, New Delhi.
2. Seghal Chopra and Seghal Sultan **Modern Physics**, S.Chand and Co, 1998, New Delhi.
3. Saxena.A.K Principles of Modern Physics, Narosa Publishing House Pvt, Ltd., Fourth Edition, 2014.



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)

DEPARTMENT OF PHYSICS

(For those who joined in 2018-2019 and after)

Programme : UG	Part III	: Core
Semester : III & IV	Hours per week	: 02
Subject Code : 18UPHCP2	Credit	: 02

MAJOR PHYSICS PRACTICAL – II

Course Outcomes

CO1: To develop experimental knowledge by handling various apparatus

CO2: To know the various components and its important

CO3: To know the circuit connections and functioning of experiments.

CO4: To analyse various types of measuring instruments.

Any 14 experiments.

1. Determination of  $M$  and  $B_H$  - Tan C method
2. Laurent's Half Shade Polarimeter - Specific rotatory power
3. Determination of  $M$  - Axial coil
4. Potentiometer - Temp. Coefficient of coil
5. Potentiometer - Comparison of EMF's
6. Table Galvanometer - Figure of merit
7. Spot Galvanometer - Figure of merit
8. Spot Galvanometer - Charge sensitiveness
9. Owen's Bridge - Determination of  $L$
10. De sauty's Bridge -  $C1/C2$
- 11 Spot Galvanometer - Comparison of EMF's
12. Spot Galvanometer - Comparison of capacities
13. Refractive Index of the material - Spectrometer
14. Grating -  $N$  and  $\lambda$
15. Air Wedge - Thickness of a wire
16. Newton's Rings - Radius and wavelength measurements





MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)

DEPARTMENT OF MATHEMATICS

(For those who joined in 2018-2019 and after)

Programme	: Physics	Part III	: Allied
Semester	: IV	Hours per week	: 04
Sub code	: 18UMTA41	Credit	: 04

### ALLIED MATHEMATICS – IV

#### Course Outcomes

**CO1:** To develop logical skills in solving the differential equations.

**CO2:** To introduce the concepts of an analytic function.

**CO3:** To familiarize bilinear transformations.

**CO4:** To familiarize the applications on skill development.

#### Unit – I:

Exact Differential Equation – Second Order Differential Equations.

#### Unit –II:

Second Order Equation with RHS  $x^n$ ,  $e^{ax}$ ,  $\sin ax$ ,  $\cos ax$ ,  $e^{ax} \sin ax$ ,  $e^{ax} \cos bx$ .

#### Unit –III:

Laplace Transforms– Solution of Differential Equation using Laplace Transforms.

#### Unit –IV:

Analytic Functions – Properties – C– R equations.

#### Unit – V:

Bilinear Transformations – Cross Ratio.

#### Text Books:

1. Dr. Arumugam. S, **Ancillary Mathematics Volume III**, New Gamma publishing House, July 2009, Palayamkottai.

Unit I – Chapter 1 : Section 1.3 & 1.5

Unit II – Chapter 2 : Section 2.1 to 2.3

Unit III – Chapter 3 : Full

Unit IV – Chapter 6 : Full

Unit V – Chapter 7 : Full

**Reference books:**

1. Narayanan.S and Manicavasagam Pillai.T.K., **Differential Equation and its Application**,  
Viswanathan.S, Printers and Publishers Pvt. Ltd., Reprint 2006, Chennai.
2. Duraipandian.P and Dr. Udaya Baskaran.S, **Allied Mathematics Volume II**,  
S.Chand and Company LTD, Revised edition 2008, New Delhi.
3. Dr. Arumugam. S, **Complex Analysis**, Scitech Publication, reprint, June 2004, Chennai.



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)

DEPARTMENT OF CHEMISTRY

(For those who joined in 2018-2019 and after)

Programme	: B.Sc (Physics)	Part III	: Allied
Semester	: IV	Hours	: 04
Sub code	: 18UCHA41	Credit	: 03

**Allied Chemistry – II  
INORGANIC CHEMISTRY**

**Course Outcomes:**

**CO1:** To have a basic knowledge in Periodic table

**CO2:** To understand the basic knowledge of Hydrides, Oxides and Nuclear Chemistry

**CO3:** To know about coordination compounds

**CO4:** To obtain knowledge in Nuclear Chemistry

**Unit – I PERIODIC TABLE AND ATOMIC PROPERTIES**

Modern periodic table – salient features – classification and characterization of s,p,d and f block elements – periodicity – cause – atomic properties – atomic radii and ionic radii – their periodic trends – ionization energy – factors determining ionization energy – periodic trends – electron affinity – periodic trends – electro negativity – factors determining electro negativity and their periodic trends – applications of electro negativity.

**Unit – II CHEMICAL BONDING**

V.B. Theory – Postulates of V.B Theory – Application to the formation of simple molecules like H<sub>2</sub> and O<sub>2</sub> – overlap of atomic orbitals – s-s, p-p and s-p overlap – principle of hybridization – sp, sp<sup>2</sup> and sp<sup>3</sup> hybridization – VSEPR theory. Molecular orbital theory –MO diagram of H<sub>2</sub>, He<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub> & F<sub>2</sub> molecules

**Unit – III HYDRIDES AND OXIDES**

1. Hydrogen – Isotopes of Hydrogen - ortho and para hydrogen – hydrides – definition, classification – examples.
2. Oxides – definition – classification – examples.
3. Structures of ionic crystals – Close packing – structure of NaCl, ZnS, CsCl, CaF<sub>2</sub> and TiO<sub>2</sub>.

**Unit – IV CO ORDINATION COMPOUNDS**

1. Definition – nomenclature-definition of various terms involved in coordination chemistry – Werner's theory – EAN rule – VB theory (outline only) – Nickel carbonyl – chelates.
2. Nitrogen compounds: Manufacture of ammonia and nitric acid – physic chemical principles involved in the manufacture of ammonia.

**Unit – V NUCLEAR CHEMISTRY**

1. Composition of Nucleus – Nuclear forces- Mass defect – binding energy – Nuclear stability – comparison of Alpha, Beta and Gamma rays
2. Soddy's group displacement law – Illustration – law of radioactive disintegration
3. Nuclear Fission: Definition – Principle of atom bomb – Nuclear fusion – Definition – Principle of hydrogen bomb – Comparison of Nuclear Fission and Fusion – Radioactive isotopes — radiocarbon dating technique – Applications of radioactivity.

**Text Book:**

Puri.B.R, L.R. Sharma and Kalia.KC, Principles of Inorganic Chemistry Mile Stone Publisher 31<sup>st</sup> Edition, (2011-12), New Delhi.

**Reference Books:**

1. Puri, Sharma and Kalia, Principles of Inorganic Chemistry Mile Stone Publisher and Distributor, (2009), New Delhi.
2. Madan.R.D , S Chand, Modern Inorganic Chemistry band Co-Ltd., (2012), New Delhi.
3. Lee.J.D, Wiley India, Concise Inorganic Chemistry 5<sup>th</sup> Edition, (2009), New Delhi.



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)

DEPARTMENT OF CHEMISTRY

(For those who joined in 2018-2019 and after)

Programme	: B.Sc (Physics)	Part III	: Allied
Semester	: III & IV	Hours per week	: 02
Sub code	: 18UCHAP1	Credit	: 02

**Allied Chemistry Practical – I  
VOLUMETRIC ANALYSIS (Practical)**

**Course Outcomes:**

**CO1:** To enable the students to develop skill in Acidimetry.

**CO2:** To gain know in Alkalimetry

**CO3:** To gain knowledge in Permanganometry

**CO4:** To know about the knowledge of Iodimetry.

1. Estimation of Sodium Hydroxide  
( $\text{Na}_2\text{CO}_3$  X HCl X NaOH)
2. Estimation of Hydrochloric Acid  
( $\text{H}_2\text{C}_2\text{O}_4$  X NaOH X HCl)
3. Estimation of Oxalic Acid  
(FAS /  $\text{FeSO}_4$  X  $\text{KMnO}_4$  X  $\text{H}_2\text{C}_2\text{O}_4$ )
4. Estimation of Ferrous Sulphate  
( $\text{H}_2\text{C}_2\text{O}_4$  X  $\text{KMnO}_4$  X  $\text{FeSO}_4$ )
5. Estimation of  $\text{KMnO}_4$   
( $\text{K}_2\text{Cr}_2\text{O}_7$  X FAS X  $\text{KMnO}_4$ )
6. Estimation of Sodium Hydroxide  
( $\text{KMnO}_4$  X  $\text{H}_2\text{C}_2\text{O}_4$  X NaOH)
7. Estimation of  $\text{K}_2\text{Cr}_2\text{O}_7$   
( $\text{KMnO}_4$  X FAS X  $\text{K}_2\text{Cr}_2\text{O}_7$ )
8. Estimation of  $\text{Na}_2\text{CO}_3$   
( $\text{NaHCO}_3$  X HCl X  $\text{Na}_2\text{CO}_3$ )
9. Estimation of Iodine  
( $\text{KMnO}_4$  x Thio x Iodine)

**INTERNAL = 40 MARKS**

**EXTERNAL = 60 MARKS**



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)

DEPARTMENT OF PHYSICS

(For those who joined in 2018-2019 and after)

Programme : UG	Part IV	: NME
Semester : IV	Hours per week	: 02
Subject Code : 18UPHN41	Credit	: 02

### PHYSICS OF ELECTRICAL APPLIANCES

#### Course Outcomes

**CO1:** To gain Knowledge about Conductors insulators semiconductors

**CO2:** To study simple parallel and series circuits using theorems

**CO3:** To understand the working and application of electronics components.

**CO4:** To evaluate household consumption of electrical energy.

#### Unit – I Current electricity

Concept of charge, current, potential and potential difference – Concept of resistance - Ohm's law (statement only) – Measuring instruments – Ammeter, voltmeter only.

#### Unit – II Conductivity

Conductors insulators semiconductors (definitions only) - Factors affecting the resistance of the conductors – Conductivity - Choice of material of a wire – Super conductors and its applications.

#### Unit – III Circuit Analysis

Combination of resistors series and parallel –Electrical energy and power (definition) Measurement of electrical energy - Commercial unit of electrical energy – Power rating of common electrical appliances – Household consumption of electrical energy.

#### Unit – IV Power transmission

Block diagram of transmission of electricity from power generating station to the consumes - Power distribution to a house – Connections of electrical appliances with the mains – Advantages of connecting the appliances in parallel – Disadvantages of connecting the appliances in series.

#### Unit – V House wiring

Essential components of house wiring system – Fuse –Reason for connecting the fuse - Miniature circuit breaker (MCB) – Switches – Reason for connecting the switch – Earthing – Local earthing – Earthing of an appliance - Socket.

**Text Book:**

Material will be compiled by the Department

**Reference Books:**

1. Sedha.R.S, **Applied Electronics**, S.Chand & Company Ltd, first Edition, 1990, New Delhi
2. Santiram Kal, **Basic Electronics: Devices, Circuits and It Fundamentals**, PHI Learning Pvt. Ltd, First Edition, 2002, New Delhi.
3. Harish C Roy, **Industrial and Power Electronics**, Umesh Publications, 10th edition, 2002, New Delhi.

# FIFTH SEMESTER





**MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)**  
**DEPARTMENT OF PHYSICS**  
**(For those who joined in 2018-2019 and after)**

**Class : B.Sc (Physics)**  
**Semester : V**  
**Subject Code: 18UPHC51**

**Part III : Core**  
**Hours : 05**  
**Credits : 05**

**CLASSICAL AND STATISTICAL MECHANICS**

**Course Outcomes**

**On successful completion of the course, the learners should be able to**

**CO1:** Define Frame of reference, Degrees of freedom, coordinate systems, Phase space and energy distribution

**CO2:** Elaborate conservation laws, constraints, cyclic coordinates ensembles, velocity distribution law.

**CO3:** Understand the concepts of microstate, macro state, ensemble, phase space, thermodynamic probability and Fermi-Dirac statistics.

**CO4:** Examine centre of mass of frame of reference, Lagrangian's equations from D'Alembert's principle, Hamilton's equations in coordinate systems, Boltzmann theorem on entropy and probability, three distribution laws.

**CO5:** Importance of conservation of energy, principle of virtual work, momentum and cyclic coordinates, quantum statistics, Bose-Einstein statistics

**Unit I**

Space and Time (Frame of reference)-Newton's Laws of motion- Inertial frames- Gravitational Mass – Mechanics of particle- Conservation Laws-Conservation of linear momentum- Conservation of angular momentum- Conservation of energy – work, kinetic energy and work energy theorem- Conservative force and potential energy. Mechanics of a System of particles - External and internal forces- Centre of mass- Conservation of linear momentum- Centre of mass of frame of reference- Conservation of angular momentum- Conservation of energy –Kinetic energy- Potential energy- Conservation theorem.

**Unit II**

Basic concepts, coordinate systems - Degrees of freedom—configuration space. Constraints- Holonomic constraints- Non holonomic constraints, Examples. Forces of constraints. Generalised coordinates – Principle of virtual work – D'Alembert's principle- Lagrangian's equations from D'Alembert's principle.

**Unit III**

Generalised momentum and cyclic coordinates- significance of translation and rotation cyclic coordinates – symmetry properties – Hamilton's Equations - Hamilton's Equations in different Coordinate systems. Examples of Hamiltonian dynamics – (Harmonic oscillator, motion of a particle in central force field)

#### Unit- IV

Macrostate and microstate systems-Ensembles- phase space - Thermo dynamic probability-Boltzmann's theorem on entropy and probability-Fundamental postulates of statistical mechanics-Statistical equilibrium

#### Unit-V

Need of Quantum statistics - Maxwell-Boltzmann statistics-Maxwell-Boltzmann energy distribution law - Maxwell-Boltzmann's velocity distribution law- Bose-Einstein statistics-Bose-Einstein distribution law- Fermi-Dirac statistics-Fermi-Dirac distribution law- -comparison of the three distribution laws.

#### Text Book-1:

1. Upadhyaya, **Classical Mechanics, Himalaya Publishing House, Delhi** 5<sup>th</sup>, Edition, 2005, Reprint-2017

Unit 1- Chapter - 1.1- 1.63, 1.7.1- 1.7.5, 1.7.8

Unit 2-Chapter - 2.1, 2.2, 2.3, 2.3.1-2.3.4, 2.4, 2.5, 2.6, 2.7.

Unit 3 – Chapter - 3.1, 3.2, 3.3.3, 3.5, 3.6, 3.7

#### Text Book-2:

1. Brijlal, N.Subrahmanyam, P.S.Hemne, **Heat Thermodynamics and statistical physics** S.Chand and Co, New Delhi, First Edition 1968, Reprint 2014.

Unit 4- Chapter – 9.7, 10.10.1-10.10.3, 10.4, 9.8, 10.15, 10.8, 11.2,

Unit 5-Chapter – 11.3, 11.6, 12.1, 12.2, 12.5, 12.8, 12.15.

#### Reference Books:

1. G.Aruldas, **Classical Mechanics**, PHI Pvt. Ltd, New Delhi, Fourth Edition, 2013.
2. S.P.Kuila, **Fundamentals of Quantum Mechanics Statistical Mechanics & Solid State Physics**, Books and Allied (P) Ltd, Kolkatta, First Edition, 2013.
3. R.Takwle and P.S.Puranik, **Introduction to Classical mechanics**, TMH Publishers, New Delhi, 2<sup>nd</sup> Edition, 20



**MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)**  
**DEPARTMENT OF PHYSICS**  
**(For those who joined in 2018-2019 and after)**

**Class : B.Sc (Physics)**  
**Semester : V**  
**Subject Code: 18UPHC52**

**Part III : Core**  
**Hours : 05**  
**Credits : 05**

**ANALOG ELECTRONICS**

**Course Outcomes**

On successful completion of the course, the learners should be able to

**CO1:** Understand Thevenin's and Norton's Theorem, Two port Network Analysis , N type and P type semiconductors, NPN and PNP transistors, CE Amplifier, Hartley, Colpitt and Phase Shift Oscillator, Multivibrator , AM and FM Modulation,

**CO2:** Applying and deriving current ,voltage and power gain, input and output impedance of CE amplifier using 'h'parameter,Op-Amp for making adder, subtractor , differentiator and integrator

**CO3:** Analyse biasing of diodes and transistors

**CO4:** Evaluating Barkhausen criterion for oscillations

**CO5:** Construction of oscillators and astablemultivibrator using discrete components

**Unit-I**

Thevenin's Theorem – Norton's Theorem – Thevenin – Norton Conversion - Two port Network Analysis – 'h'Parameter only - Semiconductors – Types of semiconductor – p-n junction diode – Biasing a p-n junction – Zener diode characteristics – Voltage regulator using Zener diode.

**Unit-II**

Transistor – three types of transistor connection – Relation between  $\alpha$ ,  $\beta$ ,  $\gamma$  – Load line (DC & AC) and Operating Point (Q point) – Biasing circuits – Base bias - Emitter Feedback bias –Voltage divider bias – Collector feedback bias – FET Parameters - FET characteristics.

**Unit-III**

Small signal CE Amplifier – Calculation of voltage gain, current gain, power gain, input and output impedance using h parameter – Frequency response of amplifier – Power amplifier –Push Pull amplifier (class B power amplifier)-OP AMP characteristics-OP AMP as adder, subtractor, differentiator and Integrator

**Unit-IV**

Feedback principle – Positive and Negative feedback – Barkhausen criterion – Transistor

oscillators – Hartley, Colpitt and Phase Shift Oscillator with mathematical analysis - Astablemultivibrator using transistors with mathematical derivation.

**Unit-V**

Modulation – Types of modulation – Amplitude modulation – Modulation index - Modulated power output – Frequency Modulation– Expression for frequency modulated voltage - Block diagram of AM & FM transmitters and receivers – Digital Modulation.

**Text Book:**

1. G.Joserobin and A.Ubald Raj, **Analog Electronics and Digital Electronics**, Indira Publication, New Delhi, First edition, 2008.

Unit I Page No: 5-29, 38-63

Unit II Page No: 88 - 128

Unit III Page No: 138 - 154, 161 - 174, 183-191

Unit IV Page No: 207 - 239

Unit V Page No: 249 - 262, 264-266, 269-272, 279 -282

**Reference Books:**

1. V.K.Metha, **Principles of Electronics**, S.Chand and co., New Delhi, 2002.
2. B.L.Theraja ,**Basic Electronics**, S.Chandand co., New Delhi, 2003
3. Salivahanan, Sureshkumar, Vallavaraj, **Electronics Devices and Circuits**, Tata Mc. Graw Hill, New Delhi,2004
4. Ambrose & Vincent Devaraj, **Elements of Solid State Electronics**, Indra Publications, New Delhi, 1994.
5. J.J.Bophy, **Basic Electronics**, Tata Mc Graw Hill, New Delhi, IV edition, 1983.



**MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)**  
**DEPARTMENT OF PHYSICS**  
**(For those who joined in 2018-2019 and after)**

**Class : B.Sc (Physics)**  
**Semester : V**  
**Subject Code: 18UPHE51**

**Part III : Elective**  
**Hours : 04**  
**Credits : 04**

**NUCLEAR PHYSICS**

**Course Outcomes**

**On successful completion of the course, the learners should be able to**

- CO1:** Understand the nuclear forces, models of nuclear structure, elementary particles, laws of radio activity fission and fusion reactions, Types of nuclear reactors.
- CO2:** Application of nuclear binding energy, Synchrotron, synchrocyclotron, wavelength of crystal spectrometer, Thermo nuclear reaction, Radio isotopes .
- CO3:** Analyse nuclear models, chamber, internal conversion of energy, C-N cycle and P-P cycle, nuclear reactor.
- CO4:** Evaluate liquid drop model, photographic emulsion technique, neutrino theory and  $\beta$  decay, van Allen belts, electricity from nuclear energy.
- CO5:** Create knowledge in the particle accelerators, disintegration energy, Nuclear Transmutations, varies types, Radio isotopes.

**Unit I –Nuclear Structure**

General Properties of atomic nucleus – Nuclear Binding energy – Nuclear stability – Yukawa's theory (No. derivation) – Theories of nuclear composition – Proton Electron hypothesis – Nuclear forces - Models of nuclear structure – Liquid drop model – Binding energy formula – Shell model

**Unit II – Nuclear Accelerators and Detectors**

Particle accelerators – Synchrocyclotron – Betatron–Detectors – Wilson cloud chamber – Bubble chamber – Elementary particles – Particles and AntiParticles – Conservation laws and symmetry.

**Unit III – Radioactivity**

Laws of radioactivity – Half life period – Mean life – Radio carbon dating – Alpha rays – Properties - Range – Geiger Nuttal law – Experimental determination of range – Alpha disintegration energy – Gamow's Theory of alpha decay – Beta rays – Neutrino theory of beta decay – Gamma rays – Origin – Internal conversion.

**Unit IV – Nuclear Reactions**

Nuclear transmutations by alpha particles , protons, deuterons, neutrons and electrons – Photo disintegration – Nuclear fission – Explanation for release of energy - Nuclear fusion – (C- N cycle and P-P Cycle) - Thermo nuclear reactions – Controlled thermo nuclear reactions.

### Unit V –Nuclear Energy

Production of electricity from Nuclear energy – Nuclear reactors – General features of nuclear reactor – Different types of nuclear reactors – Pressurized water reactors – Boiling water reactors – Fast Breeder reactors – Radiation hazards- Radio isotopes and their applications.

#### Text Book:

1. R.Murugesan and Kiruthiga Sivaprasath, **Modern Physics**, S.Chand and Co., New Delhi Sixteenth Edition, 2012.

Unit I : Chapter: 27 (Section: 27.1 - 27.12)

Unit II: Chapter: 29 (Section: 29.7, 29.9 and 29.11)

Chapter: 30 (Section: 30.5, 30.6, 30.8)

Chapter: 38 (Section 38.1, 38.2 and 38.6)

Unit III: Chapter: 31 (Section: 31.4, 31.10 - 31.12, 31.16, 31.22 - 31.25, 31.30, 31.31 and 31.35)

Unit IV: Chapter: 34 (Section: 34.7)

Chapter 35 (Section 35.2 - 35.4, 35.7 - 35.9)

Chapter 37 (Section 37.1, 37.5, 37.6 and 37.10)

Unit V: Chapter 35 (Section: 35.5 and 35.6)

Chapter 36 (Section 36.1 - 36.3)

Chapter 32 (Section 32.1 - 32.5)

#### Reference Books:

1. D.C.Thayal, **Nuclear Physics**, Himalaya Publishing House, NewDelhi, 2004.
2. I. Kaplan,**Nuclear Physics**, Tata McGraw Hill, NewDelhi,1995.
3. ArtherBeiser, **Perspective of Modern Physics**, Tata McGraw Hill, NewDelhi, 1997.
4. D.I.Sehgal, K.I.Chopra, and N.K.Sehgal, **Modern Physics**, Sultan Chand and Sons Publications, 7<sup>th</sup> Edition, New Delhi, 1993.



**MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)**  
**DEPARTMENT OF PHYSICS**  
**(For those who joined in 2018-2019 and after)**

<b>Class</b>	<b>: B.Sc (Physics)</b>	<b>Part III</b>	<b>: Elective</b>
<b>Semester</b>	<b>: V</b>	<b>Hours</b>	<b>: 04</b>
<b>Subject Code:</b>	<b>18UPHE52</b>	<b>Credits</b>	<b>: 04</b>

**CONDENSED MATTER PHYSICS**

**Course Outcomes**

On successful completion of the course, the learners should be able to

**CO1:** Understand crystal structure, free electron theory of metals, types of magnetism, polar and non polar dielectrics, properties of semiconductor.

**CO2:** Application of Miller indices, conductivities of metals, Langevin's theory of dia and para magnetism, Intrinsic and Extrinsic semiconductor.

**CO3:** Analyse the structure of diamond and zinc blende, Widemannfranz law, magnetic materials, types of polarization, carrier concentration.

**CO4:** Evaluate specific heat theories of solids, BCS theory, hard and soft magnetic materials, frequency and temperature dependence, variation of Fermi level.

**CO5:** Create knowledge in the forming crystal structure

**Unit I:**

Crystal lattice – Unit cell – Bravais lattice – Miller indices – Crystal structures and calculation of packing factor (SC, BCC, FCC) – Structure of diamond and Zinc blende – Specific heat theories of solids – Einstein's theory of specific heat – Debye's theory of specific heat

**Unit II:**

Free electron theory of metals – Electron drift, mobility, mean free path, relaxation time, electrical and thermal conductivities of metals – Widemann Franz law – Super conductivity – Properties of Superconductors - BCS theory - Applications of super conductors (Squids, Magneticlevitaion)

**Unit III:**

Different types of magnetism – Dia, para, ferro, anti ferro and ferimagnetism – Langevin's theory of dia and para magnetism – Weiss theory of ferro magnetism – Magnetic materials – Properties and applications – Hard and soft magnetic materials – Ferrites.

**Unit IV:**

Dielectrics – Polarization – Polar and non polar dielectrics – Dielectric constant – Polarisability – Clausius - Mosotti relation - Different types of polarization – electronic, ionic, orientational, space charge polarizations – Dependence of polarization on frequency and temperature – Dielectric loss – Dielectric strength and break down.

**Unit V:**

Semiconducting materials-General properties of the semiconductors-Classification of semiconductors-Intrinsic semiconductor-Carrier concentration derivation-Variation of Fermi level with temperature-Extrinsic semiconductor-Carrier concentration in n-type and p-type semiconductor-Variation of Fermi level with temperature and impurity concentration-Direct and Indirect band gap semiconductors

**Text Book:**

1. Dr. M. Arumugam, **Material Science** , Anuradha Publications, III Revised Edition, Reprint 2016.

Unit – I : Page No., 3.1 – 3.2, 3.4-3.5, 3.7-3.8, 3.18-3.21, 3.24, 3.26, 4.37-4.48

Unit – II: Page No., 4.2, 5.5 – 5.9, 5.16 – 5.20, 8.1- 8.5, 8.12, 8.15.

Unit – III: Page No., 7.1 – 7.14, 7.23 – 7.29

Unit – IV: Page No., 6.1 – 6.14, 6.17 – 6.20

- 2 Dr. M. Arumugam, Solid State Physics, Anuradha Publication, First Edition, 2004.

Unit – V: Page No., 9.1 - 9.17

**Reference Books:**

1. R. K. Puri and V.K. Babbar, **Solid state physics**, S.Chandand Co, I Edition, 1997.
2. Halliday Resnick, Jearl Walker, **Principles of physics** (9<sup>th</sup> Edition), Wiley India Pvt. Ltd., New Delhi, 2012.
3. Dr. P. Mani, **Engineering Physics– II**, Dhanam Publications, Nineth Edition, Reprint November 2015.





**MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)**  
**DEPARTMENT OF PHYSICS**  
**(For those who joined in 2018-2019 and after)**

<b>Class</b>	<b>: B.Sc (Physics)</b>	<b>Part III</b>	<b>: Elective</b>
<b>Semester</b>	<b>: V</b>	<b>Hours</b>	<b>: 4</b>
<b>Subject Code:</b>	<b>18UPHE53</b>	<b>Credits</b>	<b>: 4</b>

**ASTROPHYSICS**

**Course Outcomes**

**On successful completion of the course, the learners should be able to**

**CO1:** Understand basic concepts of positional astronomy like astronomical coordinate system, astronomical techniques, various types of optical telescopes and telescope mountings, various types of detectors and their use with telescopes and Physics of sun and our solar system.

**CO2:** Measure distances, time, temperature and radius of star.

**CO3:** Analysis of speed of light, Chandrasekhar's Limit and differential Rotation of Sun.

**CO4:** Evaluate aperture, focal length and magnification or power of telescopes.

**CO5:** Develop ideas on Future of Universe.

**UNIT: I Sky**

Understanding the Sky-Constellation – Birth of Modern Astronomy – Geocentric Theory – Heliocentric Theory.

**UNIT: II Light and Telescopes**

The Speed of Light – The Constancy of the Speed of Light – The Special Theory of Relativity – Telescopes – Aperture – Focal length – Magnification or Power – Types of Optical telescopes – Reflecting Telescopes – Refracting Telescopes – Telescope Mountings – Radio Telescopes – Infrared Telescopes – Ultraviolet, X- Ray and Gamma Telescopes.

**UNIT:III Our Solar system**

Planets – Terrestrial Planets – The Jovian Planets – Mercury – Venus – Earth and the Moon – Mars – Jupiter – Saturn – Uranus – Neptune – Dwarf Planets and Kuiper Belt – Kepler's Laws – Comets – Asteroids – Meteoroids – Meteors – PHOs. Stars: Star Formation – The Hertzsprung – Russell (HR) Diagram – Chandrasekhar's Limit – Distance Determination. Parallax Method of Stars – Limitation of Distance Measurement Using Stellar Parallax – Absolute and Apparent Magnitude – Star Death.

**UNIT: IV SUN**

Sun Structure – Temperature at Various Zones – Sunspots, Solar Flares and Evershed Effect – Differential Rotation of Sun – Prominences – Granules – Nuclear Fusion – Seasons – Moon – Lunar eclipse – Solar Eclipse – Binary Stars.

**UNIT: V Cosmology**

Astronomy and cosmology – Expansion of the Universe – Cosmic Ray Background – The Steady State alternative – Dark Matter and Dark Energy – Big Bang and Big Crunch – Pulsating Theory – Galaxies – Closed, Open and Flat universe – Future of Universe – Cosmology, Philosophy and Theology.

**Text Book:**

1. Dr. S. Stephen Rajkumar Inbanathan, **Introduction to Astronomy for Beginners**, 2019.

<b>UNIT –I</b>	:	Chapter–1 & 2
<b>UNIT–II</b>	:	Chapter –3
<b>UNIT–III</b>	:	Chapter –4 & 5 (5.1 to 5.5)
<b>UNIT–IV</b>	:	Chapter –5 (5.6 to 5.10)
<b>UNIT–V</b>	:	Chapter –6

**Reference books:**

1. Jay M. Pasachoff, **ASTRONOMY From the earth to the universe**, saunders college publishing, 2006.
2. DianahL. Moche, **ASTRONOMY A self- teaching guide**, John Wiley & sons, Inc, 2015.



**MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)**  
**DEPARTMENT OF PHYSICS**  
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**Class : B.Sc (Physics)**  
**Semester : V&VI**  
**Subject Code: 18UPHCP3**

**Part III : Core**  
**Hours : 03**  
**Credits :-**

**NON – ELECTRONICS PRACTICAL**

**Course Outcomes**

**On successful completion of the course, the learners should be able to**

**CO1:** Understand the function of instruments like spectrometer and spot galvanometer

**CO2:** Relate analyse angle of incidence and emergence

**CO3:** Find wavelength of light and particle size using laser

**CO4:** Compare the impedance and power factor of LR and CR circuits

**CO5:** Justify, Bridge circuits, Grating, LCR circuits

**ANY 14 EXPERIMENTS**

- |                                   |   |   |
|-----------------------------------|---|---|
| 1. Spectrometer                   | - | i-d curve   |
| 2. Spectrometer                   | - | $i - i'$  |
| 3. Grating                        | - | Minimum deviation method                            |
| 4. Spectrometer                   | - | Cauchy's Constants                                  |
| 5. Spectrometer                   | - | Hartmann's Interpolation formula                    |
| 6. L.C.R                          | - | Series resonance circuit                            |
| 7. L.C.R                          | - | Parallel resonance circuit                          |
| 8. Spot Galvanometer              | - | Determination of (M) Mutual induction               |
| 9. Spot Galvanometer              | - | Comparison of (M) Mutual inductances                |
| 10. Anderson's Bridge (AC Method) | - | Self inductance                                     |
| 11. Maxwell's Bridge (AC Method)  | - | Self inductance                                     |
| 12. Owens Bridge (AC Method)      | - | Self inductance                                     |
| 13. Spot Galvanometer             | - | Absolute Capacity of a Condenser                    |
| 14. Spot Galvanometer             | - | High resistance by Leakage                          |
| 15. Impedance and Power factor    | - | L.R.circuit   |
| 16. Laser                         | - | Determination of wavelength of and<br>particle size |



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<b>Class</b>	<b>: B.Sc (Physics)</b>	<b>Part III</b>	<b>: Core</b>
<b>Semester</b>	<b>: V&amp;VI</b>	<b>Hours</b>	<b>: 03</b>
<b>Subject Code:</b>	<b>18UPHCP4</b>	<b>Credits</b>	<b>:-</b>

**ELECTRONICS PRACTICAL**

**Course Outcomes**

On successful completion of the course, the learners should be able to

- CO1:** Understand functions of operational amplifier, Half adder, Full adder  
**CO2:** Show the various Rectifier circuit, Diode, Transistor characteristics  
**CO3:** Use various stages of amplifier circuits and oscillator – Frequency  
**CO4:** Learn the circuit connections using various electronic components by individual soldering method  
**CO5:** Interpret Cathode Ray Oscilloscope, Trainer Board Circuits, 8085 Microprocessor

**ANY 14 EXPERIMENTS**

- |                                |   |   |
|--------------------------------|---|---|
| 1. Zener Diode                 | – | Characteristics                           |
| 2. Transistor                  | – | Characteristics C.E mode                  |
| 3. Determination Band gap      | - | Semiconductor                             |
| 4. Zener                       | - | Voltage Regulator                         |
| 5. Single Stage Amplifier      | - | Gain and Bandwidth                        |
| 6. Hartley Oscillator          | - | Frequency and Inductance of pair of coils |
| 7. Astable Multivibrator       | - | Discrete Components only                  |
| 8. Logic Gates                 | - | Discrete Components only                  |
| 9. OPAMP                       | – | Integrator and Differentiator             |
| 10. Astable Multivibrator      | - | IC 555                                    |
| 11. Universal NOR Gate         | - | IC 7402                                   |
| 12. Universal NAND Gate        | - | IC 7400                                   |
| 13. Half Adder, Full Adder     |   |   |
| 14. Four Bit Binary Adder      |   |   |
| 15. Four Bit Binary Subtractor |   |   |
| 16. 8085 Microprocessor        | - | Add and Subtract Two 8 bit numbers        |



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**(For those who joined in 2018-2019 and after)**

**Class : B.Sc (Physics)**  
**Semester : V&VI**  
**Subject Code: 18UPHPR1**

**Part III : Core**  
**Hours : 02**  
**Credits : -**

### **PROJECT**

#### **Course Description**

The Project is conducted by the following Course Pattern.

#### **Internal**

Presentation	}	<b>40</b>
Submission		

#### **External**

Project Report	}	<b>60</b>
Viva Voce		

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<b>Total</b>	<b>- 100</b>
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**DEPARTMENT OF PHYSICS**  
(For those who joined in 2018-2019 and after)

**Class : B.Sc., ( Physics)**

**Semester : V**

**Subject Code : 18UPHS51**

**Part IV : Skill**

**Hours : 02**

**Credits : 02**

**GEMOLOGY**

**Course Outcomes:**

**On successful completion of the course, the learners should be able to**

**CO1:** Define Scratch test, Hardness, Gem, crystalline and Amorphous materials, carving, lap materials

**CO2:** Explain Polariscopes, Dichroscopes, mineral crystallization, Mineral groups, Gem nomenclature, gem structure chart

**CO3:** Apply Moh scale for crystals, Gas crystallization, natural and man made gems, Faceting style, medical field

**CO4:** Distinguish types of tests on gems, pearl, emerald, diamond and colored stones, round cut and step cut, weights and measure

**CO5:** Justify acid test, durability of crystal, rock formation, organic and inorganic cushion shapes, standard gem sizes.

**Unit-I: Introduction to Gemology**

Definitions - gemology, gemologist, Gem- different type of tests on gems- quality scratch test, acid test .

**Identification of Gems Hardness and wear ability.**

Polariscopes Dichroscopes, Refractive index, specific gravity (definition and formula), Hardness definition, Moh scale of hardness, Moh scale for different crystals, durability of crystals, wearing and worn of crystals, hardness and scratching (with quartz as example), cleavage.

**Unit-II : Gem formation**

Definition of gem, pearl, amber, opal, emerald.- Making of crystals-five requirements of crystallization-Mineral crystallization- igneous, metamorphic, and sedimentary- rock formation(rock cycle)- Magma crystallization-Gas crystallization- Environmental Changes Contact Metamorphism-Regional Metamorphism-Surface Water-Gems Formed in the Earth's Mantle.

### Unit-III: Classification of Gems

Precious and Semiprecious, Diamonds and Colored Stones, Natural and Man Made, Organics and Inorganics, Crystalline and Amorphous Materials, Aggregates, Rocks, Minerals, Species and Varieties, Series and Blends, Mineral Groups.

### Unit-IV: Types of gem cutting.

Tumbling, Cabochon cutting, Faceting, Carving, cleavage, Gem nomenclature, Shapes, Faceting styles- round cut, Brilliant cut, step cut, cushion shaped , barion cut, Portugese cut, Fantasy cut.

### Unit-V: Physical Properties and Medical applications of gems:

Chalcedony, Diamond, Pearl, choosing a diamond, Birthstone list, weights and measure, Gem structure chart, standard gem sizes, gem stone size chart, lap materials Medical applications of various gems, seven Chakras of human body and chakra healing using gems.

#### Text Book:

1. Jayabalakrishnan.S.S. “**Gemology**” First edition 2020 Shanlax Publications, Madurai.  
Unit - I            1, 1.1 – 1.4  
Unit - II            2, 2.1 – 2.13  
Unit – III          3, 3.1 – 3.12  
Unit – IV          4.1 – 4.10  
Unit – V            5.2, – 5. 4, 5.5 – 5.10,  
                          6, 6.1 – 6.4, 6.6

#### Reference Books:

1. Cally Hall., **Handbook on Gemstones** –Dorling Kindersley Hand book 1<sup>st</sup> edition, London, 2000.
2. Smithsonian., **Rock and Gem**, Penguin Random House, 1<sup>st</sup> edition 2005.

#### E-Books from Library N –List

1. Anderson, Basil W. (1990) *Gem Testing*. Rev. by E. A. Jobbins.10th ed., Butterworth, London.
2. Anderson, Basil W., and James Payne. (1998) *The Spectroscope and Gemology*. Gem Stone Press, Woodstock, VT.
3. Field, J.E., ed. (1992) *Properties of natural and synthetic diamond*. **Academic Press**, London, New York.

# SIXTH SEMESTER





**MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)**  
**DEPARTMENT OF PHYSICS**  
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<b>Class</b>	<b>: B.Sc (Physics)</b>	<b>Part III</b>	<b>: Core</b>
<b>Semester</b>	<b>: VI</b>	<b>Hours</b>	<b>: 05</b>
<b>Subject Code: 18UPHC61</b>		<b>Credits</b>	<b>: 05</b>

**QUANTUM MECHANICS AND RELATIVITY**

**Course Outcomes**

**On successful completion of the course, the learners should be able to**

- CO1:** Define De Broglie wavelength, eigen values and functions, free particle, frame of reference, rest energy
- CO2:** Derive Planck's law of radiation Schrodinger equation, particle in a box, principle of relativity, mass energy equivalence
- CO3:** Utilize Planck's law of radiations, properties of the wave functions, finite square well potential, Galilean transformation, Einstein's postulates
- CO4:** Analyze inadequacy of classical mechanics, orthogonal wave functions, ether hypothesis, barrier penetration problems, addition of velocities
- CO5:** Importance of De Broglie waves, Schrodinger wave equation time dependent and independent, Michelson Morley experiment, Lorentz transformation equations

**Unit-I : Wave Properties**

Planck's Quantum theory- Planck's Hypothesis- Derivation of Planck's law of Radiation- Inadequacy of classical mechanics -Matter wave-Expression for de-Broglie Wavelength- Other Expressions for de-Broglie Wavelength- Phase velocity(or Wave Velocity) of de-Broglie Waves- Group Velocity- Expression for Group Velocity- Experimental study of matter-Heisenberg's uncertainty principle.

**Unit-II : Schrodinger Equation:**

Derivation of Time-Dependent form of Schrodinger equation - Time-Independent form of Schrodinger equation- Eigen values and Eigen Functions-Operator for momentum Properties of the wave function- Orthogonal wave function- Normalised wave function.

**Unit-III : Applications of Schrodinger Equation:**

The free particle-The particle in a box: Infinite square well potential - Finite square potential well-Rectangular potential well-Potential step-The Barrier penetration problem-Tunnel effect-Linear Harmonic oscillator.

**Unit-IV : Newtonian Relativity:**

Frame of reference- Newtonian Principle of Relativity- Galilean Transformation of Equations-The ether hypothesis – The Michelson-Morley Experiment.

**Unit-V : Special Theory of Relativity:**

Einstein postulates- The Lorentz transformation equations- Length Contraction- Time dilation- Relative of simultaneity- Addition of velocities- Variation of mass with velocity- Mass energy equivalence- Relation between total energy, the rest energy, and the momentum.

**Text book:**

1. R.Murugesan, Er.Kiruthiga Sivaprasath, **Modern Physics**, S.Chand, New Delhi, Revised edition 17<sup>th</sup> Revised Edition, 2014.

Unit – I: 6.7, 7.1, 7.2, 7.2.1- 7.2.5, 7.3, 7.5.

Unit – II: 8.1, 8.1.1.

Unit – III: 8.2, 8.3, 8.4, 8.5, 8.7, 8.8, 8.8.1, 8.9.

Unit – IV: 1.1, 1.2, 1.3, 1.4, 1.5, 1.6.

Unit – V: 1.7, 1.8, 1.9, 1.10.11.1, 1.12, 1.13, 1.14(1.14.1).

**Reference Books:**

1. R.Sathiyapraksh, **Quantum Mechanics**, Ratan Praksan Mandir, New Delhi, 1994.
2. Seghal Chopra and SeghalSultan, **Modern Physics**, S.Chand and Co, New Delhi, 1998
3. R. Murugesan , **Mechanics and Relativity**, Properties of Matter, Practical Physics, First Edition, Madurai, August 2006.



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<b>Class</b>	<b>: B.Sc. (Physics)</b>	<b>Part III</b>	<b>:</b>
<b>Core</b>			
<b>Semester</b>	<b>: VI</b>	<b>Hours</b>	<b>:</b>
<b>05</b>			
<b>Subject Code: 18UPHC62</b>		<b>Credits</b>	<b>:</b>
<b>05</b>			

**DIGITAL ELECTRONICS**

**Course Outcomes**

On successful completion of the course, the learners should be able to

**CO1:** Understanding of number systems, Boolean functions, logic gates, flip flops and Sequential Circuits.

**CO2:** Applying Binary number system to Sequential Circuits.

**CO3:** Synthesis of Boolean functions, simplification and construction of digital circuits by employing Boolean algebra.

**CO4:** Synthesising and simplifying the Boolean equations for Sequential Circuits

**CO5:** Constructing logic gates, flip flops, adders, subtractors, multiplexer, encoder, decoder, Astablemultivibrater using IC 555, D/A and A/D converters.

**UNIT – I**

Number system – Binary, decimal, octal, hexadecimal – conversion from one to other - Binary addition, subtraction, multiplication, division – 1’s and 2’s complement subtraction – 9’s and 10’s complements – Binary coded decimal (B C D) – BCD addition - weighted Binary codes and 8421 code – Non-weighted codes – excess 3 code and gray code – Alpha numeric code ( ASCII code only) Boolean logic operations (OR ,AND, NOT) – Basic laws of Boolean algebra (Boolean addition, subtraction & multiplication)-Properties ( commutative, associative, distribution, absorption laws, consensus laws, principle of duality) – De Morgan’s theorems – simplification of Boolean expressions.

**UNIT – II**

Positive and negative logic – logic gates – OR, AND, NOT, NOR, NAND, EXOR, EXNOR – universal gates – Logic families – RTL (NOT gate) – DTL (NOR and NAND gates) – TTL (NAND gate) – Half adder – Full adder – Half subtractor – Full subtractor – 4 bit binary adder – 4 bit binary subtractor.

**UNIT – III**

Flip flops – RS flip flop (using NOR logic and NAND logic) – clocked RS flip flop – D flip flop – edge triggering – JK flip flop – JK master slave flip flop - Counters- Types of counters - 4 bit binary ripple counter – Shift register- Ring counter

#### UNIT – IV

Multiplexer – 4 to 1 multiplexer– De-multiplexer - 1 to 4 de-multiplexer –Decoder – 3 to 8 decoder –BCD to decimal decoder – BCD to seven segment decoder – Encoder - Decimal to BCD encoder.

#### UNIT – V

Timer IC 555 block diagram, mono and astablemultivibrator – Digital to analog converter (D/A) – Binary Ladder type - Analog to digital converter (A/D) - Successive approximation type .

#### Text book:

1. S.Salivahanan, S.Arivazhagan, **Digital Circuits and Design**, Vikas Publishing House Pvt. Ltd., 4<sup>th</sup> Edition, Noida, 2012.

**Unit I:** Chapter 1 [1.1, 1.2 (1.2.1 to 1.2.7), 1.4, 1.5 (1.5.1 to 1.5.5), 1.6, 1.7, 1.8 (1.8.1), 1.9(1.9.1, 1.9.2, 1.9.5), 2.1, 2.2, 2.3 (2.3.1, 2.3.2, 2.3.3), 2.4 (2.4.1 to 2.4.4), 2.5].

**Unit II:** Chapter 3 [3.1, 3.2, 3.3(3.3.1 to 3.3.8), 4.5, 4.7, 4.9 (4.9.1), 5.3, 5.4, 5.6, 5.7, 5.8 (5.8.1, 5.8.2)]

**Unit III:** Chapter 7 [7.3, 7.3.1, 7.4, 7.5, 7.6, 7.10.2, 8.2, 9.1 (9.1.1), 9.2, 9.3].

**Unit IV:** Chapter 6 [6.1, 6.2, 6.2.1, 6.4, 6.4.1, 6.5, 6.5.2, 6.5.6, 6.5.9, 6.7, 6.7.2].

**Unit V:** Material will be given by the Department

#### Reference Books:

1. Malvino and Leach, **Principles of Digital Electronics**, Tata McGraw – Hill Edition, Fifth Edition, New York, 2004.
2. R.P.Jain, **Modern Digital Electronics**, Tata McGraw – Hill Edition, Fourth Edition, New Delhi, 2011.



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**DEPARTMENT OF PHYSICS**  
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**Class : B.Sc (Physics)**  
**Semester : VI**  
**Subject Code: 18UPHE61**

**Part III : Elective**  
**Hours : 04**  
**Credits : 04**

**NANOPHYSICS**

**Course Outcomes**

On successful completion of the course, the learners should be able to

**CO1:** Understand the energy band, synthesis of nano material, basic principle of electron Microscope structure of nano material, application of nanomaterial.

**CO2:** Application of electrical conduction in metals, lithographic peocers and its limitations Scanning electron microscope, X-ray diffraction medicine energy sector.

**CO3:** Analyse the free electron model preparation of Nanomaterial, X-ray analysis, types types of method-next generation computer.

**CO4:** Evaluate electron transport in semiconductors, Molecular beam epitaxy, Transmission electron Microscope, X-ray line shape analysis, water purification

**CO5:** Develop idea on low dimensional system, other process, other microscope, small angle x- ray Scattering

**UNIT – I**

Energy bands-density of states at low-dimensional structures –electrical conduction in metals- classical theory-the drude model-quantum theory –the free electron model-conduction in insulators-electron transport in semiconductors – various conduction mechanisms in 3D (bulk), 2D (thin film)and low dimensional systems .

**UNIT – II**

Top-down vs bottom up technique-lithographic process and its limitations-nonlithographic techniques- plasma arc discharge- sputtering-evaporation-chemical vapour deposition-pulsed laser deposition- molecular beam epitaxy- sol-gel technique-electrodeposition-other process

**UNIT – III**

Basic principles of electron microscopy – scanning electron microscope (SEM) – energy dispersive X-ray ananalysis (EDX)- Transmission electron microscope (TEM)- Scanning Tunneling Microscope (STM) - Atomic Force Microscope (AFM) (Qualitative analysis only)

#### UNIT – IV

Structure of nanomaterials- X-ray diffraction-(XRD)- the laue method- rotating crystal method- powder method -determination of grain size (Scherrer's formula) -.X-ray line shape analysis –analysis of some commercially important oxides – small angle X-ray scattering (SAXS)

#### UNIT – V

Applications of nanomaterials – medicine-energy sector- next generation computer-high sensitivity sensors- water purification- communication- food – fabric industry – environment- automobiles – ceramic industry – molecular machine –nanobiometrics

#### Text Book:

1. K.K. Chattopadhyay, A.N. Banerjee, **Introduction to Nanoscience and Nanotechnology**, PHI learning Private, 2012.

Unit – I : Page No., 36 - 60

Unit – II : Page No., 109-161

2. M.A. Shah , Tokeer Ahmad **Principles of Nanoscience and nanotechnology** Narora publishing house Pvt. Ltd., 2013

Unit – III : Page No., 67 - 86

Unit – IV : Page No., 93-109

Unit – V : Page No., 155-184

#### Reference Books:

1. C. Dupas, P. Houdy, M. Lahmani, **Nanoscience Nanotechnologies and Nanophysics**, Springer, 2006.
2. Amretashis Sengupta, Chandan Kumar Sarkar, **Introduction to Nano**, Springer, 2015.
3. S.M. Lindsay, **Introduction to Nanoscience**, Oxford University Press, 2010.



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)

DEPARTMENT OF PHYSICS

(For those who joined in 2018-2019 and after)

Class	: B.Sc., ( Physics)	Part III	: Elective
Semester	: VI	Hours	: 04
Subject Code:	18UPHE62	Credits	: 04

### MEDICAL INSTRUMENTATION

#### Course Outcomes

**On successful completion of the course, the learners should be able to**

**CO1:** Recalling and Understanding concepts of the basics of electrode, colorimeter, Shortwave, Microwave, ultrasonic waves

**CO2:** Differentiate the Electrode types, Internal and External Defibrillators , Single channel, multichannel telemetry system, Thermograph , Endoscopes ,Lasers in Medicine , Computer Tomography

**CO3:** Build the knowledge in the field of Electro Cardiography , Electromyography , Respiratory Rate Measurement , Dializers , Nuclear imaging Techniques , Physiological monitoring system in space station

**CO4:** Utilization of Micropipet , Blood cell counter, Pacemakers, Electro Surgical Diathermy , Telemedicine.

**CO5:** Influence of Electro Oculography , oxygenerators , Cryogenics Applications , Design of Bio Telemetry , Pulse measurement

#### Unit – I: Electro – Physiology and Bio – Potential Recording

Origin of Bio – Potentials – Primary, Secondary active transport – Bio-electric potentials – Bio-potential Electrodes – Types of Electrodes – i)Metallic Electrode ii) Micropipet – Depth electrode – Needle electrode – Surface electrode - Chemical electrodes – Basic components of Bio Medical system – Types of amplifiers – Electro Cardiography(ECG) – Electro Encephalography(EEG) Electromyography(EMG) – Electro Oculography(EOG) – Electro Retinography (ERG)

#### Unit – II: Bio-chemical and Non-Electrical parameter Measurement

Colorimeter and photometers – Auto analyzer – Blood flow Measurements – Cardiac output Measurement – Respiratory Rate Measurement – Blood pressure Measurements – Temperature measurement – Pulse measurement – Blood cell counter.

### Unit –III Assist Devices

Pacemakers – Types, Components, specifications, methods of stimulation, Difference between Internal and External – Defibrillators – AC Defibrillation, DC Defibrillation, Dual peak and synchronizer DC Defibrillator, Dialyzers – Haemodialysis, Peritoneal Dialysis, Difference between Extracorporeal and Intracorporeal Dialysis – Heart Lung Machine Model, - Cardio vascular Circulation, Blood pumps, oxygenators

### Unit – IV Physical Medicine and Biotelemetry

Diathermy – Shortwave, Microwave, ultrasonic, and Electro Surgical Diathermy – Bio Telemetry – Design of Bio Telemetry – Radio Telemetry systems – Single channel, multichannel telemetry system – Problems in implant Telemetry – Advantages of Bio Telemetry – Physiological monitoring system in space station – E Health – Electrical safety.

### Unit – V Recent Trends in medical Instrumentation:

Thermograph – Endoscopes – Lasers in Medicine – Cryogenics Applications - Nuclear imaging Techniques – Computer Tomography – Principle, working, applications – Telemedicine- Ultrasound scanning.

#### Text Book:

1. R.LakshmiRekha, C.Ravikumar, **Medical Electronics**, Suchitra Publications, Second Edition 2016.

Unit –I	Chapter 1.1.1, - 1.1.1.1, 1.1.1.2, 1.1.2.6, 1.2-1.9
Unit –II	Chapter 2.4 – 2.12
Unit –III	Chapter 3 – 3.1 – 3.4.
Unit –IV	Chapter: 4.1 – 4.3
Unit –V	Chapter: 5.1 – 5.5.

#### Reference Books:

1. R.S. Khandpur, **Hand Book of Biomedical Instrumentation**, Tata McGraw-Hill, First Edition, New Delhi, 1999.
2. L. Cromwell, F.J. Welbell, E.J. Pfeiffer, **Biomedical Instrumentations and Measurements**, PHI Ltd, New Delhi, Second Edition, 2006.
3. John G. Webster, Editor, **Medical Instrumentation Application and Design**. John Willey and Sons. INC, Third Edition, Singapore, 1998.





**MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)**

**DEPARTMENT OF PHYSICS**

**(For those who joined in 2018-2019 and after)**

**Class : B.Sc., (Physics)**

**Semester : VI**

**Subject Code: 18UPHE63**

**Part III : Elective**

**Hours : 04**

**Credits : 04**

## **OPTOELECTRONICS AND FIBREOPTIC COMMUNICATION**

### **Course Outcomes**

**On successful completion of the course, the learners should be able to**

**CO1:** Understand multimode fibre, losses in fibre, LED materials, optical couplers, fibre optic sensors

**CO2:** Illustrate propagation of light in an optical fibre, bending losses, PN junction photo detector, splicing procedure, Ruby laser

**CO3:** Justify acceptance angle and cone, waveguide dispersion, photodiode, photo transistor, bi-conically tapered directional coupler, transmitter for communication

**CO4:** Importance of optical fibre, dispersion techniques, semiconductor laser diodes, offset butt-joint directional coupler, fibre based modems

**CO5:** Classify step index fibre, graded index fibre, glass fibre and Plastic fibre, PIN photo diode, Avalanche photo diode, beam splitting and bi-conically tapered directional coupler

### **Unit-I Optical Fibres**

Importance of optical fibres-propagation of light waves in an optical fibre-basic structure of an optical fibre and propagation of light wave through it- acceptance angle and acceptance cone of a fibre-numerical aperture (General)- fibre: Classification-stepped index fibre-graded index multimode fibre.

### **Unit-II Fibrellosses and Dispersion**

Losses in fibres- scattering losses-adsorption losses-bending losses-fibre materials-glass fibres-plastic fibres-Dispersion in an optical Fibre-Inter-modal dispersion-Material chromatic dispersion-Wave guide dispersion.

### **Unit-III Sources and Detection**

LED (Light Emitting Diode)- structures of LED- LED materials- Fibre LED coupling-semiconductor laser diode - Characteristics of photo-detectors- photo emissive photo-detector-Avalanche photo-diode-Photo transistor.

#### Unit-IV Optical couplers

Types of optical couplers-biconically tapered directional coupler- offset butt-joint directional coupler-beam splitting directional coupler- splicing of fibre-steps involved in splicing procedure-loss comparison

#### Unit-V Lasers & Communication system

Laser principle – Characteristics of Laser radiation – Different kinds of Lasers – Ruby Laser – He-Ne Laser – Carbandioxide laser-Fibre optic communication system block diagram- Transmitter for fibre optic communication-laser transmitter-fibre optic receiver-repeaters-fibre based modems-trans receiver- fibre optic sensors.

#### Text Books

1. Subir Kumar Sarkar, **Optical Fibres and Fibre Optic Communication Systems**, S.Chand & Company Ltd.

Unit –I : Chapter 1.2, 1.3, 2.2-2.5, 3.1, 3.2, 3.5

Unit – II : Chapter 8.3, 8.4, 8.6, 8.7

Unit-III : Chapter 9.1, 9.2, 9.2.1-9.2.3, 9.2.5, 9.3.3, 10.2, 10.3, 10.8, 10.9

Unit-IV : Chapter 12.2, 12.2.1-12.2.3, 13.1, 13.4, 13.6

Unit –V : Chapter 15.1, 15.2, 15.6, 15.12, 15.15, 15.16, 16.2

2. P.K. Palanisamy, **Semiconductor Physics and optoelectronics**, Second edition Scitech Publications(india) Pvt Ltd.

Unit-II : Chapter 5.13, 5.13.1-3, 5.14, 5.14.1, 5.14.2

3. Dr.M.Arumugam, **Material Science**, Anuradha Publications, Third edition, 2016.

Unit- V : Chapter 10.9.1-10.9.3

#### Reference Books

1. G.Keiser, **Optical Fiber Communication**, TMH. Ltd, New Delhi, First Edition, 2010.
2. S.C.Gupta, **Optical Fiber Communication and its Applications**, PHI Learning Pvt.Ltd, New Delhi, First Edition, 2004.
3. Dr. M. Arumugam, **Optical Communication**, Anuradha publications
4. S.Salivahanan, N. Sureskumar and A. Vallavaraj, **Electronic Devices and Circuits**, Tata McGraw-Hill Publishing Company Ltd, New Delhi, Second Edition, 2011.
5. A.P.Godse, U.A.Bakshi, **Electronic Devices**, Technical Publication, Pune, First Edition, 2009.



**MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)**  
**DEPARTMENT OF PHYSICS**  
**(For those who joined in 2018-2019 and after)**

**Class : B.Sc (Physics)**  
**Semester : V&VI**  
**Subject Code: 18UPHCP3**

**Part III : Core**  
**Hours : 03**  
**Credits : 05**

**NON – ELECTRONICS PRACTICAL**

**Course Outcomes**

**On successful completion of the course, the learners should be able to**

**CO1:** Understand the function of instruments like spectrometer and spot galvanometer

**CO2:** Relate and analyse angle of incidence and emergence

**CO3:** Find wavelength of light and particle size using laser

**CO4:** Compare the impedance and power factor of LR and CR circuits

**CO5:** Justify, Bridge circuits, Grating, LCR circuits

**ANY 14 EXPERIMENTS**

- |                                   |   |                                       |
|-----------------------------------|---|---------------------------------------|
| 1. Spectrometer                   | - | i-d curve                             |
| 2. Spectrometer                   | - | $i - i'$                              |
| 3. Grating                        | - | Minimum deviation method              |
| 4. Spectrometer                   | - | Cauchy's Constants                    |
| 5. Spectrometer                   | - | Hartmann's Interpolation formula      |
| 6. L.C.R                          | - | Series resonance circuit              |
| 7. L.C.R                          | - | Parallel resonance circuit            |
| 8. Spot Galvanometer              | - | Determination of (M) Mutual induction |
| 9. Spot Galvanometer              | - | Comparison of (M) Mutual inductances  |
| 10. Anderson's Bridge (AC Method) | - | Self inductance                       |
| 11. Maxwell's Bridge (AC Method)  | - | Self inductance                       |
| 12. Owens Bridge (AC Method)      | - | Self inductance                       |
| 13. Spot Galvanometer             | - | Absolute Capacity of a Condenser      |
| 14. Spot Galvanometer             | - | High resistance by Leakage            |
| 15. Impedance and Power factor    | - | L.R.circuit                           |
| 16. Laser                         | - | Determination of wavelength of and    |
| particle                          |   | size                                  |



**MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)**  
**DEPARTMENT OF PHYSICS**  
**(For those who joined in 2018-2019 and after)**

<b>Class : B.Sc (Physics)</b>	<b>Part III : Core</b>
<b>Semester : V&amp;VI</b>	<b>Hours : 03</b>
<b>Subject Code: 18UPHCP4</b>	<b>Credits : 06</b>

**ELECTRONICS PRACTICAL**

**Course Outcomes**

**On successful completion of the course, the learners should be able to**

- CO1:** Understand functions of operational amplifier, Half adder, Full adder
- CO2:** Show the various Rectifier circuit, Diode, Transistor characteristics
- CO3:** Use various stages of amplifier circuits and oscillator – Frequency
- CO4:** Learn the circuit connections using various electronic components by individual soldering method
- CO5:** Interpret Cathode Ray Oscilloscope, Trainer Board Circuits, 8085 Microprocessor

**ANY 14 EXPERIMENTS**

- |                                |   |   |
|--------------------------------|---|---|
| 1. Zener Diode                 | – | Characteristics                           |
| 2. Transistor                  | – | Characteristics C.E mode                  |
| 3. Determination Band gap      | - | Semiconductor                             |
| 4. Zener                       | - | Voltage Regulator                         |
| 5. Single Stage Amplifier      | - | Gain and Bandwidth                        |
| 6. Hartley Oscillator          | - | Frequency and Inductance of pair of coils |
| 7. Astable Multivibrator       | - | Discrete Components only                  |
| 8. Logic Gates                 | - | Discrete Components only                  |
| 9. OPAMP                       | – | Integrator and Differentiator             |
| 10. Astable Multivibrator      | - | IC 555                                    |
| 11. Universal NOR Gate         | - | IC 7402                                   |
| 12. Universal NAND Gate        | - | IC 7400                                   |
| 13. Half Adder, Full Adder.    |   |   |
| 14. Four Bit Binary Adder      |   |   |
| 15. Four Bit Binary Subtractor |   |   |
| 16. 8085 Microprocessor        | - | Add and Subtract Two 8 bit numbers        |



**MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)**

**DEPARTMENT OF PHYSICS**

**(For those who joined in 2018-2019 and after)**

**Class : B.Sc (Physics)**  
**Semester : V & VI**  
**Subject Code: 18UPHPR1**

**Part III : Core**  
**Hours : 02**  
**Credits : 04**

## **PROJECT**

### **Course Description**

The Project is conducted by the following Course Pattern.

#### **Internal**

Presentation	}	<b>40</b>
Submission		

#### **External**

Project Report	}	<b>60</b>
Viva Voce		

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<b>Total</b>	<b>- 100</b>
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**MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)**  
**DEPARTMENT OF PHYSICS**  
**(For those who joined in 2018-2019 and after)**

<b>Class</b>	<b>: B.Sc (Physics)</b>	<b>Part IV</b>	<b>: Skill</b>
<b>Semester</b>	<b>: VI</b>	<b>Hours</b>	<b>: 02</b>
<b>Subject Code: 18UPHS61</b>		<b>Credits</b>	<b>: 02</b>

**BASICS IN MICROPROCESSORS**

**Course Outcomes**

**On successful completion of the course, the learners should be able to**

**CO1:** Define address bus, instruction, looping, counters and time delays and stack

**CO2:** Describe Pins and signals, logic instruction, 16 Bit arithmetic instruction, loop technic, traffic signal control program

**CO3:** Write Architecture of microprocessors, Branch instruction. Arithmetic operations related to memory, time delay one register loop, subroutine

**CO4:** Functioning of bus organizations, addressing modes, looping counting and indexing,

**CO5:** Assess microprocessors operations, Data transfer instruction, Arithmetic operations, time delays and counters, subroutine program, Counter design with time delay.

**Unit-I Architecture**

Microprocessor initiated operations and Bus organization-pins and signals-Architecture

**Unit-II Instruction set**

8085 Instruction-Data transfer instruction-Addressing modes-Arithmetic and logic instruction-Branch instruction.

**Unit-III Assembly language program**

Looping counting and Indexing-16 bit arithmetic instruction-Arithmetic operations related to memory-Logic operations.

**Unit-IV Counters and time delays**

Counters and time delays-Time delay using one register-Loop within a loop technique-Counter design with time delay.

**Unit-V Stack and Subroutine**

Stack-subroutine-traffic signal control program.

**Text book**

1. Ramesh S Gaonkar **Microprocessor Architecture, programming, and Applications with the 8085**, , V<sup>th</sup>Edn., Penram International publishing (India) private limited.2011.

Unit I : Section 3.1, 3.1.1, 3.1.2, 3.3, 4.1, 4.1.1-4.1.3, 4.1.5

Unit II : Section 6.1, 6.1.1, 6.2, 6.2.1, 6.2.2, 6.3, 6.3.1-6.3.3, 6.4, 6.4.1-6.4.4

Unit-III : Section 7.1, 7.2, 7.2.1-7.2.4, 7.2.6, 7.3, 7.3.1, 7.4, 7.4.1, 7.5, 7.5.1, 7.5.3

Unit-IV : Section 8.1, 8.1.1, 8.1.3, 8.1.5

Unit-V : Section 9.1(Pages 296-302), 9.2, 9.2.1(Upto to page 314)

**Reference Books:**

1. B.Ram, Dhanbath Rai **Fundamentals of microprocessors and microcomputers**, Publications, VIth Edn., 2006.
2. A.P. Mathur. **“Introduction to microprocessor”**, III Edition, TMH 2004.
3. N.Mathivanan. **“Microprocessors, PC hardware and interfacing”**, Prentice Hall of India, New Delhi, 2005.