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 question paper (Summative Examinations)
(For Part I, Part II, Part III , NME & Skilled Paper in Part IV)

The question paper may have 3 parts.

Duration of the Summative Examinations is 3 hours

Part –A

Five questions (answer all) 5 x 02 = 10 Marks
(One question from each Unit)

Part –B

Five questions (‘either …. or ‘ type) 5 x 07 = 35 Marks
(One question from each Unit)

Part –C

Three questions out of five 3 x 10 =30 Marks
(One question from each Unit)

Total 75 Marks

Question paper pattern

(for part IV – Environmental Studies and Value Education only)

Part –A

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

Part –B

Three questions out of Five 3 x 15 = 45 marks

Total 75 marks

Note: No unit shall be omitted ;not more than two question from each unit

Pattern of the Question paper (Internal)

Part –A

Five questions (answer all) 5 x02=10 Marks

Part –B

Two questions (‘either …. or ‘ type) 2 x 05=10 Marks

Part –C

One questions out of two 1 x 10 =10 Marks

Total 30 Marks

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

Part –A

Four questions (‘either …. or ‘ type) 4 x05=20 Marks

Part –B

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

Total 30 Marks

Minimum Marks for a Pass

1. 40% of the aggregate (Internal +Summative Examinationss).
2. No separate pass minimum for the Internal Examinations.
3. 27 marks out of 75 is the pass minimum for the Summative Examinationss.

Program Specific Outcome

PSO1 Gives in-depth ideas and Description of atomic structure, Nuclear Reactor, Materials function, types of spectrum, medical equipments

PSO2 Covers concepts, definitions, properties of matter, Electricity, Electromagnetism, optics, atomic physics, Nuclear Physics, Digital Electronics, Material Science.

PSO3 Helps the students to analyze the circuit models and to design the circuit.

PSO4 Helps the students to solve the theoretical problems

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
B.Sc (Physics)
Table : I : Course pattern
(Those Who Joined in 2015-2016 and after)

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) 4(4)	5(5) 5(5) 4(4)	44	44	10	1000
Core Subject(P)	2(0)	2(2)	2(0)	2(2)	2(0) 3(0) 3(0)	2(5) 3(5) 3(5)	24	19	5	500
Allied Subject - I	6(4)	3(2) 3(2)	4(4)	2(2) 2(2)	-	-	20	16	6	600
Allied Subject – I (T) Allied Subject – I (P)	**4(4) 2(0)**	**4(3) 2(1)**	**4(4) 2(0)**	**4(3) 2(1)**			**24**	**16**	**6**	**600**
Allied Subject - II (T) Allied			4(4)	4(3) 2(1)	4(4)	4(3)	24	16	6	600

Subject - II (P)			2(0)		2(0)	2(1)				
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
Total	**30** **(20)**	**30** **(22)**	**30** **(20)**	**30** **(23)**	**30** **(20)**	**30** **(35)**	**180**	**140**	**46**	**4600**

SEMESTER – V							
Subject Code	**Title of the Paper**	**No. of Courses**	**Hours /Week**	**Credits**	**Maximum Marks**		
					Int	**Ext**	**Tot**
	Part-III Core Subject	1	5	5	25	75	100
15UPHC51	Atomic Physics and Quantum Mechanics						
15UPHC52	Analog Electronics	1	5	5	25	75	100
15UPHC53	Nuclear Physics	1	4	4	25	75	100
15UPHCP3	Non - Electronics Practical	--	2	--	--	--	--
15UPHCP4	Analog Electronics Practical	--	3	--	--	--	--
15UPHCP5	Digital Electronics Practical	--	3	--	--	--	--
	Part-III Allied Subject						
15UCHA51	Allied Chemistry – III Organic, Inorganic and Physical Chemistry - II	1	4	4	25	75	100
15UCHAP2	Allied Chemistry Practical-II Organic Analysis	--	2	--	--	--	--
	Part-IV Skill Subject	1	2	2	25	75	100
15UPHS51	Sound						
	Total	**5**	**30**	**20**	**125**	**375**	**500**

SEMESTER – VI

Subject Code	Title of the Paper	No. of Courses	Hours /Week	Credits	Maximum Marks		
					Int	Ext	Total
	Part-III Core Subject						
15UPHC61	Classical and Statistical Mechanics	1	5	5	25	75	100
15UPHC62	Digital Electronics	1	5	5	25	75	100
15UPHC63	Material Science	1	4	4	25	75	100
15UPHCP3	Non - Electronics Practical	1	2	5	40	60	100
15UPHCP4	Analog Electronics Practical	1	3	5	40	60	100
15UPHCP5	Digital Electronics Practical	1	3	5	40	60	100
	Part-III Allied Subject						
15UCHA61	Allied Chemistry – IV Organic and Physical Chemistry-II	1	4	3	25	75	100
15UCHAP2	Allied Chemistry Practical-II Organic Analysis	1	2	1	40	60	100
	Part-IV Skill Based Subject						
15UPHS61	Opto Electronics	1	2	2	25	75	100
	Total	**9**	**30**	**35**	**285**	**615**	**900**

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF PHYSICS
Course Structure – Semester wise CBCS (w.e.f.2017-2018)

Class	**: B.Sc (Physics)**	**Part III**	**: Core**
Semester	**: V**	**Hours**	**: 05**
Subject Code	**: 15UPHC51**	**Credits**	**: 05**

ATOMIC PHYSICS AND QUANTUM MECHANICS

Course Outcomes

CO1 To understand the atomic structure, different energy levels, X-ray diffraction.

CO2 To study the dual nature of material particles.

CO3 To understand the basic concepts in quantum mechanics, wave function and Schrodinger equation.

Unit – I

Introduction – Bohr atom model (no derivation) – application of Bohr's theory – critical potentials – two ways of exciting an atom – Somerfield 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 – quantum numbers – coupling schemes – Electron Configurations - magnetic dipole moment due to orbital and spin motion of the electron – Stern and Gerlach experiment – Stark effect.

Unit – II

Pauli's exclusion principle – electronic structure of atom – Zeeman effect, its types - normal Zeeman effect – theory and experiment - X rays – production – Coolidge tube – Bragg's law – Bragg's spectrometer – X ray spectra – properties of continuous and characteristics X rays – Moseley's law and its importance – Compton effect – theory and experiment.

Unit - III

Photo electric effect – experimental investigation – laws of photo electric effect – Einstein's photo electric equation – Planck's theory of black body radiation – theory and experiment – Dual nature of matter and radiation – 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.

Unit – IV

Wave mechanical atom model - basic postulates of wave mechanics- derivation of time dependent and time independent form of Schrodinger wave equation – properties of wave function (physical significance, Orthogonal and normalized wave functions, probability density, Eigen functions and Eigen values).

Unit – V

Schrodinger equation for a free particle in one dimensional potential well (particle in a box), its Eigen function and Eigen values – potential step – Barrier penetration problem – Linear Harmonic oscillator.

Text book:

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

UNIT I: Chapter 6 (6.1, 6.4, 6.8, 6.9, 6.11, 6.12, 6.13, 6.14, 6.17, 6.18, 6.19, 6.20, 6.28).

UNIT II: Chapter 6 (6.15, 6.23), Chapter 7 (7.1, 7.2, 7.6, 7.7, 7.11, 7.12, 7.13, 7.14)

UNIT III: Chapter 8 (8.1, 8.4, 8.5), Chapter 9, Chapter 11 (11.1, 11.2, 11.3, 11.4).

UNIT IV: Chapter 11 (11.5, 11.7, 11.8, 11.9).

UNIT V: Chapter 11 (11.10, 11.11, 11.12, 11.13).

Reference Books:

1. J.B.Rajam, **Atomic Physics**, S.Chand and Co, New Delhi, 2004.
2. R.Sathiyapraksh, **Quantum Mechanics**, Ratan Praksan Mandir, New Delhi, 1994.
3. Seghal Chopra and Seghal Sultan, **Modern Physics**, S.Chand and Co, New Delhi, 1998.

MANNAR THIRUMALAI NAICKER COLLEGE
(Autonomous)
DEPARTMENT OF PHYSICS
Course Structure – Semester wise CBCS (w.e.f.2017-2018)

Class	**: B.Sc (Physics)**	**Part III**	**: Core**
Semester	**: V**	**Hours**	**: 05**
Subject Code	**: 15UPHC52**	**Credits**	**: 05**

ANALOG ELECTRONICS

Course Outcomes

CO1 To study the basic concepts in analog Electronics.

CO2 To understand the working of transistor, amplifier and oscillator.

CO3 To understand the AM and FM transmission in communication.

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 α, β,Υ – 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 – Application as adder, subtractor, integrator & differentiator.

Unit-IV

Feedback principle – Positive & Negative feedback – Barkhausen criterion – Transistor Oscillators – Hartley, Colpitt & Phase Shift Oscillator with mathematical analysis -Astable multivibrator 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-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: 1- 63

Unit II Page No: 88 - 128

Unit III Page No: 138 - 153, 155-158, 161 - 174, 183-191

Unit IV Page No: 207 - 245

Unit V Page No: 249 - 262, 264-266, 269-275, 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.Chand and 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
Course Structure – Semester wise CBCS (w.e.f.2017-2018)

Class	**: B.Sc (Physics)**	**Part III**	**: Core**
Semester	**: V**	**Hours**	**: 04**
Subject Code	**: 15UPHC53**	**Credits**	**: 04**

NUCLEAR PHYSICS

Course Outcomes

CO1 To study the basic concepts of nuclear physics.

CO2 To understand the nuclear structure and nuclear energy.

CO3 To understand the radio activity and nuclear reactions work function of types of nuclear reactors

Unit I – Nuclear Structure

Introduction –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 – Collective model.

Unit II – Nuclear Accelerators and Detectors

Particle accelerators – Synchrocyclotron – Betatron— Electron Synchrotron – Proton Synchrotron – Detectors – Wilson cloud chamber – Bubble chamber – Photo graphic emulsion technique – 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 – Theory of alpha decay – Beta rays – Neutrino theory of beta decay – K-electron capture – Gamma rays – Origin – Internal conversion – Determination of wavelength by crystal spectrometer.

Unit IV – Nuclear Reactions

Nuclear transmutations by alpha particles , protons, deuterons, neutrons and electrons – Photo disintegration – Nuclear fission – Explanation for release of energy – Nuclear reactor. Nuclear fusion – (C- N cycle and P-P Cycle) - Thermo nuclear reactions – Controlled thermo nuclear reactions. Cosmic rays – Origin – Primary and secondary cosmic rays – Van Allen belts.

Unit V – Nuclear Energy

Atom bomb and Hydrogen bomb – 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, New Delhi, 2004.

2. I. Kaplan, **Nuclear Physics,** Tata McGraw Hill, NewDelhi,1995.

3. Arther Beiser, **Perspective of Modern Physics**, Tata McGraw Hill, New Delhi, 1997.

4. D.I.Sehgal, K.I.Chopra, and N.K.Sehgal, **Modern Physics,** Sultan Chand and Sons Publications, 7th Edition, New Delhi, 1993.

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF CHEMISTRY
Course Structure – Semester wise CBCS (w.e.f.2017-2018)

Class	**: B.Sc (Physics)**	**Part III**	**: Allied**
Semester	**: V**	**Hours**	**: 04**
Subject Code	**: 15UCHA51**	**Credits**	**: 04**

ORGANIC, INORGANIC AND PHYSICAL CHEMISTRY-II

Course Outcomes
CO1 To know about the adsorption and catalysis
CO2 To understand the basic idea of photochemistry and co-ordination compounds.
CO3 To have gain knowledge about hetero cyclic compounds

Unit-I

Adsorption**:** Definition – differences between adsorption and absorption – adsorbate, adsorbent – physical absorption – chemical absorption – differences between these two types – factors influencing adsorption – adsorption isotherm – Langmuir isotherm (no derivation statement only) – adsorption of gases on solid surface. (6 hrs.)

Chromatographic techniques: Principle and application-partition and adsorption chromatography - Thin layer chromatography - Column chromatography - Paper chromatography- Gas - solid and gas-liquid chromatography.(6 hrs)

Unit - II

Catalysis**:** Definition – different types of catalysis – acid – base catalysis – surface catalysed reactions – definition and examples – auto catalyst – catalytic poisoning - promoters – enzyme catalysis – characteristics.(6 hrs)

Polymers**:** Definition – Classification of polymers – properties of polymers – addition and condensation polymerization reactions with examples – natural rubber – isoprene unit – vulcanization of rubber – preparation and applications of polystyrene, urea – formaldehyde resin, Teflon and buna – S - rubber.(6 hrs)

Unit -III

Photochemistry**:** comparison of thermal and photochemical reactions – definition of photochemical reactions – laws of photochemistry – Grotthus – Draper law – quantum efficiency – reasons for low and high quantum yields with examples – consequences of light

absorption by atoms and molecules- Jablonski diagram – fluorescence – phosphorescence – photosensitization- chemiluminescene–bioluminescence – applications of photochemistry. (12 hrs)

Unit -IV

Coordination Compounds: Definition – nomenclature-definition of various terms involved in coordination chemistry – Werner's theory – EAN rule – VB theory (outline only) – Nickel carbonyl – chelates.(6 hrs)

Nitrogen compounds: Manufacture of ammonia – nitric acid – ammonium nitrate – ammonium sulphate - physico – chemical principles involved in the manufacture of ammonia. (6 hrs)

Unit - V

Heterocyclic compounds containing two heteroatoms: preparation, properties and structure of oxazole, pyrazole and imidazole (structural elucidation not required) (3 hrs)

Terpeniods: Introduction – classification – occurrence – isolation – general properties – Isoprenerule – Structures of citral geraniol, terpeniol, menthol and dipentene. (Structural elucidation not required) (4 hrs)

Hormones: – Structure, source and importance of testosterone, progesterone and thyroxin – (3 hrs.)
Chemotherapy: Antimalarials- Chloroquine and plasmoquine – preparation and its use.
Arsenical drugs: Salvarasan – 606 – Neosalvarasan - preparation and its use.(2hrs)

Text books:

Book No : 1

K.Rathinamuthu(*), R.Victoria(**), **Ancillary Chemistry**, (*) Head of the Department of Chemistry, Vivekanadha College, Thiruvedakam,(**) Head of the Department of Chemistry, Lady Doak College, Madurai, 2012.

Unit No.I : Page No.1 to 25
Unit No.II : Page No.26 to 43
Unit No.III : Page No.44 to 60
Unit No.IV : Page No.61to 87

Book No : 2

K.Rathinamuthu(*), R.Victoria(**), **Ancillary Chemistry**, (*) Head of the Department of Chemistry, Vivekanadha College, Thiruvedakam,(**) Head of the Department of Chemistry, Lady Doak College, Madurai, 1999.
Unit No.V : Page No.27 to 35, 42, 46, 47, 49 & 50

Reference Books :

1. S.Lakshmi, **Pharmaceutical Chemistry**, Sultan Chand and Sons, New Delhi, 2004.
2. Jeyashree Ghosh , **Fundamental concepts of Applied Chemistry**, S. Chand and Co Ltd, New Delhi, 2008.
3. B.R. Puri and L.R. Sharma, **Principles of Inorganic Chemistry**, Shobanlal Nagin Chand and Co Ltd, New Delhi,2000.
4. B.K. Sharma**, Industrial Chemistry**, Goel Publishing House, XIV Revised Enlarged Education, New Delhi,2004.
5. B.R. Puri , L.R. Sharma, S. Pathania, **Principles of Physical Chemistry** , Vishal Publishing Co, New Delhi, 43rd Edition , 2008.
6. P.L. Soni, HM Chawla, **Organic Chemistry**, 29th Edition, Sultan Chand and Sons, New Delhi, 2007.

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF PHYSICS
Course Structure – Semester wise CBCS (w.e.f.2017-2018)

Class	**: B.Sc (Physics)**	**Part IV**	**: Skill**
Semester	**: V**	**Hours**	**: 02**
Subject Code	**: 15UPHS51**	**Credits**	**: 02**

SOUND

Course Outcomes

CO1 To enable the students to understand the basic knowledge of sound waves.
CO2 To study the progressive waves, stationary waves and velocity of sound in different medium.
CO3 To understand Ultrasonic waves and its applications Acoustics of Buildings and sound distribution system

Unit I - Progressive waves

Introduction of progressive waves – Plane and spherical waves – Longitudinal and transverse waves – Definition for period, frequency and wave length of waves – Equation of plane progressive wave – Characteristics of progressive wave .

Unit II - Stationary waves

Demonstration of stationary waves in string's using melde's experiment – Equation for stationary waves – Difference between stationary and progressive waves – Beats and its uses.

Unit III - Velocity of sound in different medium

Velocity of longitudinal sound wave in fluid - Velocity of longitudinal sound wave in rod - velocity of sound in solids and gases – Velocity and frequency of transverse sound wave in stretched string – Laws of transverse vibration – Sonometer – Determination of the frequency of a tuning fork.

Unit IV - Ultrasonics

Production – Magnetostrictive and piezoelectric methods - Detection – Kundt's Tube – Piezo electric, thermal – Properties of ultrasonic waves and its applications
Determination of velocity of ultrasonic waves in a liquid (ultrasonic diffraction)

Unit V - Acoustics

Acoustics of buildings – Reverberation – Reverberation time and its measurement – Importance of sabine's formula – Sound absorption – Sound distribution in an auditorium.

Text Book:

1. R.Murugesen, **Mechanics Properties of Matter and Sound**, Revised Edition,1988.

Unit I: Page No: 15-20
Unit II: Page No: 27-32
Unit III: Page No: 34, 35, 43 -46, 48-53
Unit IV: Page No: 72-77
Unit V: Page No: 77-80

Reference Books:

1. M.Ghosh, **A Text book of sound**, S.Chand and Co, New Delhi, 1998.
2. Brijlal and Subramanyam., **A Text book of sound**, S.Chand and Co, 2004.

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF PHYSICS
Course Structure – Semester wise CBCS (w.e.f.2017-2018)

Class	**: B.Sc (Physics)**	**Part III**	**: Core**
Semester	**: VI**	**Hours**	**: 05**
Subject Code	**: 15UPHC61**	**Credits**	**: 05**

CLASSICAL AND STATISTICAL MECHANICS

Course Outcomes:

CO1 To enable the students to understand the basic concepts of classical mechanics and statistical mechanics.
CO2 To understand the mechanism behind the macroscopic particles the Newtonian Mechanism, Lagrange's equation, Hamilton's equation.
CO3 To Study the Velocity distribution law Fermi Dirac statistics, Maxwell-Boltzmann statistics and Bose – Einstein Statistics.

Unit I

Introduction-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

Introduction- Basic concepts, coordinate systems-Degrees of freedom—configuration space. Constraints- Holonomic constraints- Non holonomic constraints, Examples. Forces of constraints. Genaralised coordinates – Principle of virtual work – D'Alembert's principle- Langrangian's equations from D'Alembert's principle- Procedure for formation of Langrangian's equations.Langrange's Equations in presence of Non-conservative forces. Hamilton's principle and Langrange's Equations – superiority of Langrangian mechanics over Newtonian approach.

Unit III

Introduction – 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, compound pendulum, motion of a particle in central force field)

Unit- IV

Macrostate and microstate systems-Ensembles- phase space - Probability-Thermo dynamic probability-Boltzmann's theorem on entropy and probability-Fundamental postulates of statistical mechanics-Statistical equilibrium-Quantum statistics - Maxwell-Boltzmann statistics-Maxwell-Boltzmann energy distribution law - Maxwell-Boltzmann's velocity distribution law.

Unit-V

Bose-Einstein statistics-Bose-Einstein distribution law- Fermi-Dirac statistics-Fermi-Dirac distribution law- -comparison of the three distribution laws. Need of quantum statistics – Development of quantum statistics – 'h' as a Natural constant- Two cases: i)Particle in one dimensional box, ii)One dimensional Harmonic oscillator – Indistinguishability of particles and its consequences – photon gas.

TextBooks:

Text Book-1:

1. Upadhyaya, **ClassicalMechanics, HimalayaPublishingHouse, Delhi**
   5th, Edition, 2005

Unit 1- Chapter 1.1- 1.63, 1.7.1- 1.7.5, 1.7.7, 1.7.8

Unit 2-Chapter 2.1,2.2, 2.3.1-2.3.4, 2.4, 2.5,2.6,2.7,2.8,2.9,2.11,2.12

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, Revised Edition, 2014.

   Unit 4- Chapter – 9.7, 10.10.1-10.10.3, 10.4, 9.8, 10.15, 10.8, 11.2, 11.3, 11.6

   Unit 5-Chapter – 12.2, 12.5, 12.8, 12.15, 12.1, 12.3, 12.4, 12.6

Reference Books:

1. G.Aruldhas, **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, 2nd Edition, 2008.

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)

DEPARTMENT OF PHYSICS
Course Structure – Semester wise CBCS (w.e.f.2017-2018)

Class	**: B.Sc (Physics)**	**Part III**	**: Core**
Semester	**: VI**	**Hours**	**: 05**
Subject Code	**: 15UPHC62**	**Credits**	**: 05**

DIGITAL ELECTRONICS

Course Outcomes

CO1 To enable the students to understand the basic concepts of digital electronics.

CO2 To study the Binary number system.

CO3 To understand the working of logic gates, Flip-flops, multiplexer, decoder and encoder.

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, multiplication, properties, 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 eg: NOT gate – DTL eg: NOR and NAND gates – TTL eg: NAND gate – Half adder – Full adder – Half subractor – Full subractor – 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 - 4 bit binary ripple counter – Shift register - Universal Shift register.

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 astable multivibrator – Digital to analog converter (D/A) – Binary Ladder type - Analog to digital converter (A/D) - Successive approximation type – Karnaugh map – SOP (sum of product) – 2 variable, 3 variable and 4 variable - simplification using K- map.

Text book:

1.S.Salivahanan, S.Arivazhagan, **Digital Circuits and Design,** Vikas Publishing House Pvt.Ltd., 4th 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.

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF PHYSICS
Course Structure – Semester wise CBCS (w.e.f.2017-2018)

Class	**: B.Sc (Physics)**	**Part III**	**: Core**
Semester	**: VI**	**Hours**	**: 04**
Subject Code	**: 15UPHC63**	**Credits**	**: 04**

MATERIAL SCIENCE

Course Outcomes
CO1 To enable the students to understand the basic concepts of material science.
CO2 To study the crystal structure and Bonding in solids.
CO3 To understand the different types of materials and different types of magnetism.

Unit I:

Bonding in solids – Types of bonding in solids – Ionic, covalent, metallic, molecular and hydrogen bonds – Crystal structure – Crystal lattice and crystal structure – Unit cell – Bravai's lattice – Classification of crystals – Miller indices – Structure of diamond and Zinc blende – Heat capacity of solids – Limitations of Einstein's theory – Debye's theory of lattice 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 – Sources of resistivity of metals – Super conductivity – Properties of Superconductors - Applications – BCS theory.

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:

Nanomaterials – Different form of Nanomaterials – Synthesis of Nanomaterials – Preparation - Pulsed Laser Deposition, Chemical Vapour Deposition - Properties of Nanophase particles - Physical , Magnetic, Mechanical - Characterization – Scanning Electron Microscope, Transmission Electron Microscope – Applications of Nanomaterials.

Text Book:

1. Dr. M. Arumugam , **Material Science** , Anuradha Publications, III Revised Edition, Reprint 2009.

   Unit – I : Page No., 2.1 – 2.16, 3.1 – 3.11, 3.18 – 3.26, 4.37 – 4.47

   Unit – II : Page No., 4.2, 5.5 – 5.10, 5.12, 5.13, 5.16 – 5.20, 8.1- 8.5, 8.12-8.16.

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

   Unit – IV : Page No., 6.1 – 6.11, 6.13 – 6.15, 6.17 – 6.20

   Unit – V : Material will be given by the Department

Reference Books:

1. R.K. Puri and V.K. Babbar, **Solid state physics**, S.Chand and Co, I Edition, 1997.

2. Halliday Resnick, Jearl Walker, **Priniciples of physics** (9^{th} 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 CHEMISTRY
Course Structure – Semester wise CBCS (w.e.f.2017-2018)

Class	**: B.Sc (Physics)**	**Part III**	**: Allied**
Semester	**: VI**	**Hours**	**: 04**
Subject Code	**: 15UCHA61**	**Credits**	**: 03**

ORGANIC AND PHYSICAL CHEMISTRY-II

Course Outcomes

CO1 To understand the basic concept of electro chemistry and thermo dynamics

CO2 To gain the basic knowledge of spectroscopy and chemical kinetics

CO3 To understand about the basic knowledge of hetero cyclic compounds, alkaloids and vitamins.

Unit- I

1.Heterocyclic compounds: Preparation and reactions of furan, pyrrole, pyridine, quinoline, isoquinoline, preparation of uracil, thymine, adenine and guanine. (6 hrs)

2.Alkaloids: Pharmacological properties and importance of the following alkaloids nicotine, quinine, piperine and cocaine (Structural elucidation not necessary) (4 hrs)

3.Vitamins: Classification and biological functions of vitamins A, B_6, B_{12}, C, D, E and K (Structural elucidation not required) (2 hrs)

Unit -II

Thermodynamics: Importance of thermodynamics – terms used in thermodynamics – open and closed systems, state functions and path functions, extensive and intensive properties, reversible and irreversible processes, statement and mathematical form of first law of thermodynamics – heat capacity at constant volume and pressure, relation between C_p and C_v - statement of second law of thermodynamics – entropy - entropy as a thermodynamic function – dependence of entropy on variables of the system – physical significance of entropy – Gibb's free energy and its significance. (12 hrs)

Unit -III

Chemical Kinetics: Reaction rate –order and molecularity of a reaction – zero order – first order. First order rate equation and half life period – derivation. Examples of first order reactions – second order reactions – Carbon dating – enzyme catalysis Michaelis and Menton mechanism – Line weaver-Burk plot – Significance of k_m (12 hrs)

Unit- IV

Electrochemistry: Arrhenius theory of electrolytes – strong electrolytes – weak electrolytes – Ostwald's dilution law and its applications – ionic product of water and its application – solubility product. pH – definition – simple calculation of pH from molarity of acids and bases – buffer solution – definition – theory of buffer action- application.

Acid –base indicators – working range of indicators – choice of indicators – commercial cells – primary and secondary cells – Weston cadmium cell – Lead storage cell – Electroplating - application. (12hrs)

Unit -V

Spectroscopy: Basic principles of UV and IR spectroscopy – identification of simple organic molecules (ethanol and dimethyl ether, acetaldehyde and acetone, ethylene and acetylene, cis-2-butene and trans-2-butene, methylamine, dimethylamine and trimethylamine) – Proton nmr spectroscopy – Principle – Instrumentation – Chemical shift – Spectrum of ethanol. (12 hrs)

Text books :

Book No :1

1.K.Rathinamuthu(*), R.Victoria(**), **Ancillary Chemistry**, (*) Head of the Department of Chemistry, Vivekanadha College, Thiruvedakam,(**) Head of the Department of Chemistry, Lady Doak College, Madurai, 2012.

Unit.I : Page No.1 to 29

Unit.II : Page No.33 to 51

Unit.III : Page No.52 to 71
Unit.V : Page No.98 to 117

Book No :2

2. K.Rathinamuthu(*), R.Victoria(**), **Ancillary Chemistry**, (*) Head of the Department of Chemistry, Vivekanadha College, Thiruvedakam,(**) Head of the Department of Chemistry, Lady Doak College, Madurai, 1999.

Unit.IV : Page No.93 to 105, 110 to 125

Reference Books :

1. B.R. Puri, L.R. Sharma, S. Pathania, **Principles of Physical Chemistry**, 43rd Edition, Vishal Publishing Co, New Delhi, 2008 .

2. P.L.Soni H.M. Chawla, **Organic Chemistry**, 29th Edition, Sultan Chand and Sons, New Delhi, 2007.

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF PHYSICS
Course Structure – Semester wise CBCS (w.e.f.2017-2018)

Class	**: B.Sc (Physics)**	**Part IV**	**: Skill Based**
Semester	**: VI**	**Hours**	**: 02**
Subject Code	**: 15UPHS61**	**Credits**	**: 02**

OPTO ELECTRONICS

Course Outcomes

CO1 To enable the students to understand the basic concepts of Opto electronics.

CO2 To study the LED and LCD.

CO3 To understand the characteristics of laser, photo detector and fiber optics communication.

UNIT – I

Introduction – PN junction as a source (LED) – LED materials – Advantages – LCD – characteristics and action of LCD – Advantages.

UNIT – II

Laser – Introduction – characteristics of Laser – spontaneous and stimulated emission – Einstein coefficients – condition for population inversion - semiconductor laser.

UNIT – III

Photo detector – characteristics of photodetector – PN junction photo detector – PIN photo diode – Avalanche photo diode – photo transistor.

UNIT – IV

Introduction – principle of optic fiber – light transmission in a optical fiber – Acceptance angle – Numerical aperture.

UNIT – V

Fiber index profiles – Step index, graded, index fiber (transmission of signals) – Advantages of fiber optic communications – Advantages.

Text Book:

1. Dr. M. Arumugam , **Material Science** , Anuradha publications, III Revised Edition, Reprint 2009.

   Unit – I : Page No., 10.1, 10.38 – 10.40, 10.42-10.44.

   Unit – III : Page No., 10.45 – 10.46

2. Dr.P.Mani, **Engineering Physics – I**, Dhanam publications, Twelveth Edition, April 2015.

   Unit – II : Page No., 7.1-7.11, 7.15-7.17, 7.33-7.36

   Unit – IV : Page No., 8.1 – 8.11

   Unit – V :Page No., 8.16 – 8.22, 8.32 -8.35

Reference Books:

1. P.K.Palanisamy, **Semi Conductor Physics and Opto Electronics**, SCITECH publications (India) Pvt.Ltd., 2010.
2. C.K. Sarkar**,** D.C. Sarkar, **Optoelectronics and Fibre Optics Communication**, New Age International Pvt. Ltd., Publishers, 2006.

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF PHYSICS
Course Structure – Semester wise CBCS (w.e.f.2017-2018)

Class	**: B.Sc (Physics)**	**Part III**	**: Core**
Semester	**: V&VI**	**Hours**	**: 02**
Subject Code	**: 15UPHCP3**	**Credits**	**: 05**

NON – ELECTRONICS PRACTICAL

Course Outcomes

CO1 To develop the experimental knowledge and finding the correct values
CO2 Doing practice to improve their handling instruments and finding correct values
CO3 To Understand the function of instruments like spectrometer and types of Bridge circuits

LIST OF EXPERIMENTS

1. Small angled prism – Refractive Index
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 - Self inductance
11. Spot Galvanometer - Absolute Capacity of a Condenser
12. Maxwell's Bridge - Self inductance
13. Spot Galvanometer - High resistance by Leakage
14. Spot Galvanometer - Internal resistance of a cell
15. Impedance and Power factor – L.R.circuit
16. Impedance and Power factor – C.R.circuit

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF PHYSICS
Course Structure – Semester wise CBCS (w.e.f.2017-2018)

Class	**: B.Sc (Physics)**	**Part III**	**: Core**
Semester	**: V&VI**	**Hours**	**: 03**
Subject Code	**: 15UPHCP4**	**Credits**	**: 05**

ANALOG ELECTRONICS PRACTICAL

Course Outcomes

CO1 To learn the circuit connections using various electronic components by individual soldering method
CO2 To Study about the various Rectifier circuit, Diode, Transistor characteristics
CO3 To learn about various stages of amplifier circuits and oscillator – Frequency

LIST OF EXPERIMENTS

1.Zenor Diode – Characteristics

2.Transistor – Characteristics C.E .Mode

3.FET – Characteristics

4. Full Wave Rectifier - Pi (π) Filter

5. Bridge Rectifier - Pi (π) Filter

6. Zener - Voltage Regulator

7. I.C - I.C 7805 Regulated power supply

8. Single Stage Amplifier - Gain and Bandwidth

9.Two Stage Amplifier –Without feed back-Gain and Bandwidth

10. Two Stage Amplifier –With feed back-Gain and Bandwidth

11.Hartley Oscillator-Frequency and Inductance of pair of coils

12 Colpitt's Oscillator-Frequency and Inductance

13. Astable Multivibrator - Discrete Components only

14. Clipper and Clamper – Discrete Components only

15. Integrator and Differentiator - Discrete Components only

16. Logic Gates - Discrete Components only

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF PHYSICS
Course Structure – Semester wise CBCS (w.e.f.2017-2018)

Class	**: B.Sc (Physics)**	**Part III**	**: Core**
Semester	**: V&VI**	**Hours**	**: 03**
Subject Code	**: 15UPHCP5**	**Credits**	**: 05**

DIGITAL ELECTRONICS PRACTICAL

Course Outcomes
CO1 To learn the circuit connections using various electronic components
CO2 To understand functions of operational amplifier, Half adder, Full adder
CO3 To learn about handling Cathode Ray Oscilloscope, Trainer Board Circuits

LIST OF EXPERIMENTS

1. Dual Power Supply
2. Voltage Doubler and Tripler
3. OPAMP – Integrator and Differentiator
4. OPAMP – Adder and Subtractor
5. Astable Multivibrator – OPAMP
6. Astable Multivibrator – I.C. 555
7. Schmitt Trigger - I.C. 555
8. Universal NAND Gate – I.C
9. Universal NOR Gate - I.C.
10. Half Adder, Full Adder.
11. Four Bit Binary Adder
12. Shift Register
13. Ring Counter
14. 4 Bit Binary Counter
15. BCD Counter
16. 4 Bit Binary Subtractor

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF CHEMISTRY
Course Structure – Semester wise CBCS (w.e.f.2017-2018)

Class	**: B.Sc (Physics)**	**Part III**	**: Allied**
Semester	**: V&VI**	**Hours**	**: 02**
Subject Code	**: 15UCHAP2**	**Credits**	**: 01**

ALLIED CHEMISTRY PRACTICAL-II
ORGANIC ANALYSIS

Course Outcomes

CO1 To know about the identification of functional groups

CO2 To learn about the detection of different elements

CO3 To have an idea about the confirmation (test) of organic components

A study of reaction of the following organic compounds:

1. Carbohydrate
2. Amide
3. Aldehyde .
4. Ketone
5. Monocarboxylic acid
6. Dicarboxylic acid
7. Amine
8. Phenol
9. Ester
10. Nitro compound

The students may be trained to perform the specific reaction like test for element (nitrogen only), Aliphatic or aromatic, saturated or unsaturated, color reaction, functional group present and record their observation.