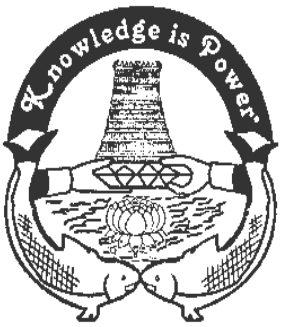
Sri Meenakshi Government Arts College for Women (Autonomous), Madurai-2

B.Sc., PHYSICS SYLLABUS FOR 2019 – 2022 BATCH

Reaccredited with "A" by NAAC



DEPARTMENT OF PHYSICS

CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR UG

FOR STUDENTS ADMITTED FROM JUNE – 2017.

DEPARTMENT OF PHYSICS

Details of Theory/ Practical Papers- Semester wise

Semester	Code	Title of the paper	Duration Hrs/week	No. of Credits	Int. Marks	Ext. marks	Total	Credit per semester
I	P11	Mechanics, Fluid dynamics and sound	4	4	25	75	100	
	PP1	Major practical-paper I	2	-	-	-	-	
	P22	Electricity	2	-	-	-	-	
	SP11	Alternative Energy Sources	2	2	25	75	100	
	AVI	Value education	1	-	-	-	-	I : 6
II	P21	Heat and Thermodynamics	4	4	25	75	100	
	PP1	Major practical-paper I	2	2	40	60	100	
	P22	Electricity	2	4	25	75	100	
	SP22	Physics in every day life	2	2	25	75	100	II: 12
	AV1	Value education	1	2	25	75	100	
III	P31	Electromagnetism	4	4	25	75	100	
	P32	Programming with C	4	4	25	75	100	
	PP2	Major practical-paper II	2	-	-	-	-	
	SP43	Astrophysics and cosmos	1	-	-	-	-	
	EXA	PED / NSS / NCC / Major related Extension activity (Not within curriculum)	2	1	100	-	100	III : 9
IV	P41	Mathematical Physics	4	4	25	75	100	
	P42	Physical and Laser optics	4	4	25	75	100	
	PP2	Major practical-paper II	2	2	40	60	100	
	SP43	Astrophysics and cosmos	1	2	25	75	100	IV : 14
V	P51	Basic electronics	4	4	25	75	100	
	P52	Atomic physics	5	5	25	75	100	
	PP3	Major practical-paper III	3	-	-	-	-	
	PP4	Major practical-paper IV	2	-	-	-	-	
	EP51	Biomedical instrumentation	5	5	25	75	100	
	EP52	Optoelectronics and fiber optic communication	5	5	25	75	100	
	SGK4	General knowledge	2	2	25	75	100	
	SP55	Spectroscopy	2	2	25	75	100	V : 23
VI	P61	Digital electronics	5	5	25	75	100	
	P62	Materials science	5	5	25	75	100	
	P63	Classical ,Statistical, Quantum Mechanics and Relativity	4	4	25	75	100	
	PP3	Major practical-paper III	3	3	40	60	100	
	PP4	Major practical-paper-IV	2	2	40	60	100	
	EP63	Nuclear physics	5	5	25	75	100	
	SP66	Physics for competitive Examinations	2	2	25	75	100	
	ENS6	Environmental Studies	2	2	25	75	100	VI : 28
		Total Credits						92

ALLIED SUBJECTS (MATHS AND CHEMISTRY) FOR PHYSICS STUDENTS :

Semester	Code	Title of the paper	**Duration of hrs/week**	**Int. marks**	**Ext. Marks**	**Total**	**No. of Credits**
I	AMI	Allied Mathematics Paper –I	7	25	75	100	5
II	AM2	Allied Mathematics Paper –II	7	25	75	100	5
III	AC1	Allied Chemistry – Paper –I	4	25	75	100	3
	CPA	Allied Chemistry Practical paper -II	3	-	-	-	-
IV	AC2	Allied Chemistry – Paper –III	4	25	75	100	4
	CPA	Allied Chemistry – Practical Paper -II	3	40	60	100	3

ALLIED PHYSICS FOR CHEMISTRY STUDENTS (I & II SEMESTER)
AND FOR MATHS STUDENTS (III & IV SEMESTER) :

Semester	Code	Title of the paper	Duration of hrs/week	Int. marks	Ext. Marks	Total	No. of Credits
I OR III	AP1	Allied physics paper-1	4	25	75	100	3
	PPA	Allied physics practical paper- I	3	-	-	-	-
II OR IV	AP2	Allied physics paper-II	4	25	75	100	4
	PPA	Allied physics practical paper-I	3	40	60	100	3

NON – MAJOR ELECTIVE PAPERS FOR SEMESTER V & SEMESTER VI

Code	Title of the paper	Duration of hrs/week	Int. Marks	Ext. marks	Total	No. of Credits
NMP1	Physics of home appliances	2	25	75	100	2
NMP2	Solar Energy and its Applications	2	25	75	100	2

CREDIT DETAILS

Total Credits : 140

CREDIT DISTRIBUTION												
Semester	Core Theory	Core Practical	Skill Based	Elective	Non Major elective	Part IV	Tamil	Eng	Allied I	Allied II	Allied II practical	**Total**
I	1x4		1x2				1x3	1x3	1x5			**17**
II	2x4	2	1x2			1x2	1x3	1x3	1x5			**25**
III	2x4					1x1	1x3	1x3		1x3		**18**
IV	2x4	2	1x2				1x3	1x3		1x4	1x3	**25**
V	1x4 1x5		2x2	2x5	1x2							**25**
VI	2x5 1x4	3+2	1x2	1x5	1x2	1x2						**30**
Total	**51**	**9**	**12**	**15**	**4**	**5**	**12**	**12**	**10**	**7**	**3**	**140**

Part III : Core Theory & Practical, Allied Theory & Practical

Part IV : Skill based & NME

Part V : Value Education, EVS & Extension Activities

Programme : B.Sc | **Part III: Core**
Semester : I | **Hours :4 P/W 60Hrs P/S**
Sub. Code : P11 | **Credits : 4**

TITLE OF THE PAPER: MECHANICS, FLUID DYNAMICS AND SOUND

Pedagogy	Hours	Lecture	Peer Teaching	GD/ Vedos/Tutorial	ICT
	4	3	-	-	1

PREAMBLE: To provide guidelines for the students covering all areas of Mechanics.

COURSE OUTCOME At the end of the Semester, the Students will be able to	**Unit**	**Hrs P/S**
CO 1:identify the concepts of dynamics of rigid bodies	1	12
CO 2:discuss about types of collision and able to derive the expression for final velocities and loss of kinetic energy	2	12
CO 3:to collect primary idea of gravitation and rocket motion	3	12
CO 4:impart the knowledge of properties of fluid, hydrostatics and kinematics of fluid flow	4	12
CO 5:analyze about Ultrasonic and its applications .	5	12

SYLLABUS

Unit – I : MECHANICS

Dynamics of rigid bodie s - Rigid body - Translational and rotational motion – Torque - Angular momentum – Angular impulse – Compound pendulum theory – Determination of g by compound pendulum.

Unit – II : COLLISION

Centre of mass - Motion of the center of mass - Impulse and impact – Collision - Elastic and inelastic collision – Newton's law of impact - Coefficient of restitution - Calculation of final velocities after impact – Direct and oblique collision - Loss of energy (direct and oblique impact) .

Unit – III : GRAVITATION

Kepler's laws of planetary motion- Law of gravitation –Variation of g with latitude, altitude and depth– Artificial Satellites – Orbital velocity – Stationery satellite - Escape velocity - Rocket motion - Expression for thrust and velocity - Rocket propulsion system - Specific impulse – Multistage rocket.

Unit - IV : FLUID DYNAMICS

Viscosity - Steady or stream lined flow - Critical velocity -Reynold's number - Significance - Equation of continuity of flow - Energy of the fluid – Bernoullie's theorem – Statement and proof – Torricelle's theorem -Venturimeter - Pitot's tube.

Unit – V : SOUND

Sound – Transverse vibrations of stretched strings - Expressions for velocity and frequency – Melde's experiment - Acoustics of buildings - Ultrasonics – Production - Properties and applications .

TEXT BOOKS :

1. Properties of Matter - R. Murugeshan, S.Chand and company Pvt. Ltd Revised Edition 2014.
2. Mechanics properties of matter and sound - R. Murugeshan, S.Chand and company Pvt. Ltd

Unit I : 10.7,10.8,10.9,6.10 (Properties of Matter)
Unit II : 19.2,8.1,8.2,8.3,8.4,8.5,8.6 (Properties of Matter)
Unit III : 6.1,6.2,6.7,6.8,6.9 (Properties of Matter), 2.1,2.3,2.4,2.6 (Mechanics properties of matter and sound)
Unit IV : 2.1,2.2,4.1,4.2,4.4, (Properties of Matter)
Unit V : 6.1,6.2,6.3,6.4,6.5,6.6,6.7 (Properties of Matter)

BOOKS FOR REFERENCE :

1. Mechanics – D.S.Mathur, S.Chand& Co., First Edition, 2004 Reprint.
2. Fundamental of Physics – HallidayResnick, Walker –Sixth Edition, Replika Press Pvt. Ltd.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I	Dynamics of rigid bodie s - Rigid body - Translational and rotational motion	4	Lecture & ICT
	Torque - Angular momentum – Angular impulse	4	Lecture & ICT
	Compound pendulum theory – Determination of g by compound pendulum	4	Lecture & ICT
UNIT II	Centre of mass - Motion of the center of mass - Impulse and impact – Collision - Elastic and inelastic collision.	5	Lecture & ICT
	Newton's law of impact - Coefficient of restitution - Calculation of final velocities after impact – Direct and oblique collision - Loss of energy (direct and oblique impact)	7	Lecture & ICT
UNIT III	Kepler's laws of planetary motion- Law of gravitation –Variation of g with latitude, altitude and depth.	5	Lecture & ICT
	Artificial Satellites – Orbital velocity – Stationery satellite - Escape velocity	3	Lecture & ICT

	Rocket motion - Expression for thrust and velocity - Rocket propulsion system - Specific impulse – Multistage rocket.	4	Lecture & ICT
UNIT IV	Viscosity - Steady or stream lined flow - Critical velocity -Reynold's number - Significance - Equation of continuity of flow - Energy of the fluid .	6	Lecture & ICT
	Framing of HypothBernoullie's theorem – Statement and proof – Torricelle's theorem -Venturimeter - Pitot'stube.esis.	6	Lecture & ICT
UNIT V	Sound – Transverse vibrations of stretched strings - Expressions for velocity and frequency – Melde's experiment	6	Lecture & ICT
	Acoustics of buildings - Ultrasonics – Production - Properties and applications	6	Lecture & ICT

Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	4	4	2	3	4	4	3	3	2	4	3.3
CO2	4	4	2	2	4	4	3	3	2	4	3.2
CO3	4	4	3	3	3	4	3	3	3	3	3.3
CO4	4	3	2	3	4	4	4	2	3	3	3.2
CO5	4	4	3	3	4	4	3	3	2	4	3.4
Mean Overall Score											3.3

Result: The Score for this Course is 3.3 (High Relationship)

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Total of Value Mean Score of COs = ---------- Total No. of Pos & PSOs	Total of Mean Score Mean Overall Score of COs =---------- Total No. of COs

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	40%	40%
UNDERSTANDING	40%	40%
APPLY	20%	20%

Course Designer: Mrs. K.Lilly Mary Eucharista Department of Physics

Programme : B.Sc., Physics **Part III : Core Course 3**
Semester : I &II **Hours : 02 P/W 60 Hrs/I&II SEM**
Sub. Code : P22 **Credits : 04**

TITLE OF THE PAPER : ELECTRICITY

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/Tutorial	ICT
	2	2	-	-	-

Preamble:
The scope of this course is to impart the basic knowledge in the elemental concepts and enhance the intellectual, experimental, analytical and Mathematical skills of the students in Electricity which has the key role in the development of modern technological world.

COURSE OUTCOME On the successful completion of the course students will able to	Unit	Hrs P/I&IIS
UNIT 1 CO1 : Understand the basic concepts of Electric field, Electric potential and various types of capacitors	1	14
UNIT 2 CO2 : Develop thorough knowledge in mechanical force and electrical images and their applications in different systems	2	12
UNIT 3 CO3 : Enhance the application skills by relating the phenomenon of electricity like Quadrant electrometer, Absolute electrometer etc.,	3	12
UNIT 4 CO4 : To understand the relationship between current and voltage in a circuit by Kirchhoff's rules. Able to analyze a complex circuit using junction rules. It address the understanding the transfer of energy through an electric circuit..	4	12
UNIT 5 CO5 : Get a clear idea about thermoelectricity and its uses which provide a pathway for the new scientific invention.	5	10

UNIT I : ELECTROSTATICS

Coulomb's law – Electric field – Electric potential – Potential at a point due to a point charge – Potential at a point due to a Uniformly charged conducting sphere – Capacitors – Capacitance of a spherical capacitor (outer sphere earthed & inner sphere earthed) – Capacitance of a Parallel plate capacitor – Capacitance of a Parallel plate capacitor partially filled with a dielectric slab – Energy stored in a charged capacitor – Loss of energy on sharing of charges between two capacitors.

UNIT II : GAUSS'S LAW AND ITS APPLICATIONS

Gauss's Law – Applications – Electric Field due to a Uniformly charged sphere – Electric Filed due to an infinite plane sheet of charge – Coulomb's theorem – Mechanical force experienced by unit area of a charged conductor – Charged soap bubble – Electrical images – Applications (i). Surface density of charge at a point on a conducting plane (ii). Force of attraction between the charge and the conducting plane.

UNIT III : ELECTROSTATIC INSTRUMENTS

Kelvin's the attracted Disc or Absolute Electrometer – Measurement of Potential difference between two given points – Determination of Relative permittivity of a material (in the form of a parallel slab) – The Quadrant electrometer – Measurement of ionization current.

UNIT IV : ELECTRICAL MEASUREMENTS

Kirchoff's laws – Wheatstone's network – Condition for balance – Carey Foster's Bridge – Potentiometer – Calibration of Ammeter – Calibration of voltmeter (Low range & High Range) – Comparison of capacitance of two capacitors.

UNIT V : THERMO ELECTRICITY

Seebeck Effect – Measurement of thermo EMF using potentiometer – Peltier Effect –Thomson Effect – Thermodynamics of thermocouple (Expressions for Peltier & Thomson Coefficients) – Thermoelectric

diagram and its uses.

TEXT BOOKS

Electricity and Magnetism - R. Murugeshan - Ninth Revised edition, 2011, S.Chand & Co. Ltd.

Unit – I – Section : 1.2, 1.4, 3.1, 3.3, 3.5, 4.1, 4.2, 4.3, 4.5, 4.7, 4.9, 4.11

Unit – II – Section : 2.2, 2.5, 2.9, 2.11, 2.12, 3.9 (ii & iii only)

Unit – III – Section : 5.1, 5.2

Unit – IV – Section : 6.6, 7.1, 7.2, 7.4

Unit – V – Section : 8.1, 8.3, 8.4, 8.5, 8.6, 8.7, 8.8

REFERENCES

1. The Text Book of Electricity and Magnetism – Brijlal and Subramanian, Twentieth Revised Edition, 1995, Ratan Prakashan Mandir - Educational and University Publishers.
2. Electricity and Magnetism - Narayanamurthi, N.Nagaratnam and N.Lakshmi Narayan, First edition, the national Publishing Company. (1992)
3. Electricity and Magnetism - K.K.Tiwari, 1993, S.Chand & Co.,

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT 1 ELECTROSTATICS			
	Coulomb's law, Electric field, Electric potential	2	**2 hours Lecture and Discussion**
	Potential at a point due to a point charge , Potential at a point due to a Uniformly charged conducting sphere	4	**3 hours Lecture and 1 hour Discussion and Quiz**
	Capacitors, Capacitance of a spherical capacitor (outer sphere earthed & inner sphere earthed)	3	**2 hours Lecture 1 hour PPT and Discussion**
	Capacitance of a Parallel plate capacitor, Capacitance of a Parallel plate capacitor partially filled with a dielectric slab	3	**2 hours Lecture 1 hour PPT and Discussion**
	Energy stored in a charged capacitor, Loss of energy on sharing of charges between two capacitors.	2	**2 hours Lecture and Discussion**
UNIT II GAUSS'S LAW AND ITS APPLICATIONS			
	Gauss's Law , Electric Field due to a Uniformly charged sphere , Electric Filed due to an infinite plane sheet of charge	**4**	**3 hours lecture 1 hour Discussion and Quiz**
	Coulomb's theorem, Mechanical force experienced by unit area of a charged conductor, Charged soap bubble	**4**	**3 hours lecture 1 hour Discussion and Quiz**
	Electrical images – Applications (i). Surface density of charge at a point on a conducting plane (ii). Force of attraction between the charge and the conducting plane.	**4**	**3 hours lecture 1 hour Discussion and Quiz**
UNIT III ELECTROSTATIC INSTRUMENTS			
	Kelvin's the attracted Disc or Absolute Electrometer	**4**	**2 hours lecture 1 hour Discussion and Quiz**

Measurement of Potential difference between two given points , Determination of Relative permittivity of a material(in the form of a parallel slab)	**4**	**2 hours lecture** **1 hour Discussion and Quiz**
The Quadrant electrometer, Measurement of ionization current.	**4**	**2 hours lecture** **1 hour Discussion and Quiz**
UNIT IV ELECTRICAL MEASUREMENTS		
Kirchoff's laws, Wheatstone's network, Condition for balance	**4**	**3 hours lecture** **1 hour Discussion and PPT**
Carey Foster's Bridge – Potentiometer, Calibration of Ammeter	**4**	**3 hours lecture** **1 hour Discussion and PPT**
Calibration of voltmeter (Low range & High Range), Comparison of capacitance of two capacitors.	**4**	**3 hours lecture** **1 hour Discussion and PPT**
UNIT V THERMO ELECTRICITY		
Seebeck Effect, Measurement of thermo EMF using potentiometer	**4**	**2 hours lecture** **1 hour Discussion and PPT**
Peltier Effect , Thomson Effect	**2**	**1 hours lecture** **1 hour Discussion and PPT**
Thermodynamics of thermocouple (Expressions for Peltier & Thomson Coefficients), Thermoelectric diagram and its uses.	**4**	**3 hours lecture** **1 hour Discussion and PPT**

Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	4	3	3	3	3	4	3	4	4	3	3.4
CO2	4	3	3	3	3	4	3	4	3	3	3.3
CO3	3	4	3	3	4	3	4	4	3	4	3.5
CO4	4	3	3	3	4	4	3	3	3	3	3.3
CO5	3	4	4	3	4	3	3	4	3	3	3.4
Mean Overall Score											3.38

Result: The Score for this Course is 3.38 (High Relationship)

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Mean Score of COs = $\frac{\text{Total of Values}}{\text{Total No. of Pos \& PSOs}}$

Mean Overall Score of COs = $\frac{\text{Total of Mean scores}}{\text{Total No. of COs}}$

ASSESSMENT RUBRICS

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%

Course Designer: Dr. P. INDRA DEVI, Assistant Professor, Department of Physics.

SEMESTER-I
SKILL BASED PAPER- I
ALTERNATIVE ENERGY SOURCES

CODE: SP11 **2 hrs/week**
Credit: 2

UNIT- I: GLOBAL SCENARIO

Global warming - Green house effect - Effects of global warming - Control measures - Ways to reduce global warming - Ozone depletion control measures.

UNIT-II: SOLAR ENERGY

Sun –the fundamental source of energy - Solar water heater - Solar cooker - Solar cells - solar mobile chargers – solar torches – solar lanterns – solar street lights – solar traffic signals - solar pumps.

UNIT-III : OTHER ALTERNATIVE ENERGY SOURCES

Hydro electric power plant- Tidal energy - Wind energy - Geothermal energy - benefits - drawback - energy transformation. - Nuclear energy - Precaution.

UNIT-IV: BIOMASS ENERGY

Energy from biomass - Anaerobic fermentation - Bio gas plant (KVIC Plant) working - benefits- drawback - Renewable and Non renewable energy source - Bio fuels.

UNIT- V: ENERGY AUDIT

Energy management - Energy audit - Energy audit in home and schools - Energy conservation – Energy conservation measures in house hold appliances

TEXT BOOK:

Study material prepared by the Department

REFERENCES:

1. Non conventional energy sources - G.D. Rai – IV Edition, IX Print, 2001,Khanna publishers, Delhi
2.Modern Physics - R. Murugeshan, Kiruthiga Sivaprasath, S.Chand & Co. Pvt. Ltd., 2016, 18th Edition.

Programme: B.Sc **Part III: Core**
Semester : II **Hours : 4 Hrs/W 60 Hrs /S**
Sub. Code : P21 **Credits: 4**

TITLE OF THE PAPER: Heat and Thermodynamics

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT
	4	1	1	1	1

PREAMBLE: Understand the basics of Thermodynamics. Acquire knowledge in low temperature physics. Understand the transmission of heat and quantum theory of radiation.

COURSE OUTCOME At the end of the Semester, the Students will be able to	Unit	Hrs P/S
UNIT 1 CO1: Understand the behavior of real gases.	1	12
UNIT 2 CO2: State and explain the laws of thermodynamics. Apply the laws to explain carnot engine. Understand the concept of entropy and derive Maxwell's equations.	2	12
UNIT 3 CO3: Understand the methods of liquefaction of air. Explain the properties of Helium I and II. Describe the process of Adiabatic demagnetization.	3	12
UNIT 4 CO4: Understand the different methods of transmission of heat. State and explain an experiment to verify Stefan's law. Explain Angstrom Pyrheliometer.	4	12
UNIT 5 CO5: Understand quantum theory of radiation and explain Einstein's and Debye's theory of specific heat.	5	12

SYLLABUS

UNIT I: STUDY OF REAL GASES

Real and ideal gases - Gas laws - Vander Waal's equation – Critical constants - Porous plug experiment - Theory and results - Joule Kelvin effect for a real gas – Relation between Boyle temperature, inversion temperature and critical temperature.

UNIT II: THERMODYNAMICS

Zeroth, I, II and III Laws - (statements alone) – Carnot's Heat Engine, Carnot's cycle-Concept of entropy - entropy change in reversible Carnot's cycle and irreversible processes - Entropy of a perfect gas – Clausius-Claypeyron latent heat equation - Maxwell's equations.

UNIT III: LOW TEMPERATURE PHYSICS

Liquefaction of air - Linde's process – Liquefaction of Helium – K-Onne's method – Helium I and II – Adiabatic demagnetisation.

UNIT IV: TRANSMISSION OF HEAT

Coefficient of thermal conductivity**,** Rectilinear flow of heat along a bar - Forbes method to find K - Cylindrical flow - k of rubber - Practical application of conduction and convection of heat – Radiation - Stefan's law - Experimental verification - Solar constant – Temperature of sun – Angstrom's Pyrheliometer .

UNIT V: QUANTUM THEORY OF RADIATION AND SPECIFIC HEAT

Distribution of energy spectrum of a black body – Wien's Law – Rayleigh Jean's Law – Planck's Radiation law – Theories of specific capacities of solid – Dulong Petit's law, Einstein's and Debye's theories.

TEXT BOOKS: Heat & Thermodynamics and statistical Physics – Brijlal, Dr. N. Subrahmanian, P.S.Hemne, Revised Edition (2010) S.Chand & Co.,

Unit 1. 1.2, 2.1, 1.9, 2.8, 2.10, 2.21, 2.24, 2.25.
Unit 2. 4.2, 4.7, 4.28, 5.15 (only statements), 4.23, 4.24, 5.1, 5.2, 5.4, 5.6, 5.9, 6.3, 6.11.
Unit 3. 7.8, 7.11, 7.12, 7.16.
Unit 4. 15.1, 15.2, 15.9, 15.14, 15.15, 15.20, 15.22, 8.12, 8.22, 8.26, 8.27, 8.28.
Unit 5. 8.6, 8.9, 8.13, 8.14, 8.15, 8.17, 14.17, 14.19, 14.20.

REFERENCES:

1. Heat and Thermodynamics - Brijlal & Subramanian, Sixteenth edition

2. Heat and Thermodynamics - Singhal & Agarwal & Prakash, Eighth Revised Edition. Prakashan (Unit

3. Heat and Thermodynamics - D.S.Mathur,Sultan Chand & Sons

4. Thermodynamics and Statistical Mechanics - S.LKakani .

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I			
	Real and ideal gases - Gas laws - Vander Waal's equation – Critical constants	4	Lecture, GD, ICT and Teaching
	Porous plug experiment - Theory and results - Joule Kelvin effect for a real gas	4	Lecture, Video, ICT and Teaching
	Relation between Boyle temperature, inversion temperature	4	Lecture, GD, ICT and Teaching

	and critical temperature.		
UNIT II			
	Zeroth, I, II and III Laws - (statements alone) – Carnot's Heat Engine, Carnot's cycle .	4	Lecture, GD, ICT and Teaching
	Concept of entropy - entropy change in reversible Carnot's cycle and irreversible processes	4	Lecture, Video, ICT and Teaching
	Entropy of a perfect gas – Clausius-Claypeyron latent heat equation - Maxwell's equations	4	Lecture, GD, ICT and Teaching
UNIT III			
	Liquefaction of air - Linde's process	4	Lecture, GD, ICT and Teaching
	Liquefaction of Helium – K-Onne's method	4	Lecture, GD, ICT and Teaching
	Helium I and II – Adiabatic demagnetisation.	4	Lecture, GD, ICT and Teaching
UNIT IV			
	Coefficient of thermal conductivity**,** Rectilinear flow of heat along a bar - Forbes method to find K	4	Lecture, GD, ICT and Teaching
	Cylindrical flow - k of rubber - Practical application of conduction and convection of heat – Radiation - Stefan's law	4	Lecture, GD, ICT and Teaching
	Experimental verification - Solar constant – Temperature of sun – Angstrom's	4	Lecture, GD, ICT and Teaching

	Pyrheliometer .		
UNIT V			
	Distribution of energy spectrum of a black body – Wien's Law – Rayleigh Jean's Law	4	Lecture, GD, ICT and Teaching
	Planck's Radiation law – Theories of specific capacities of solid – Dulong Petit's law,	4	Lecture, GD, ICT and Teaching
	Einstein's and Debye's theories.	4	Lecture, GD, ICT and Teaching

Course Outcomes (Cos)	Programme Outcomes (Pos)					Programme Specific Outcomes (PSOs)						Mean scores of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	
CO1	4	2	4	4	3	4	2	4	3	4	4	3.45
CO2	4	2	4	4	3	4	2	4	3	4	4	3.45
CO3	4	2	4	4	3	4	2	4	3	4	4	3.45
CO4	4	2	4	4	3	4	2	4	3	4	4	3.45
CO5	4	2	4	4	3	4	2	4	3	4	4	3.45
Mean Overall Score												3.45

Result: The Score for this Course is 3.45 (High Relationship)

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos \& PSOs}}$

Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%

Programme : B.Sc., Physics **Part III : Core Practical**
Semester : I &II **Hours : 02 P/W 60 Hrs/I&II SEM**
Sub. Code : PP1 **Credits : 02**

TITLE OF THE PAPER: MAJOR PRACTICAL PAPER -I

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT
	2	1	-	1	-

PREAMBLE: This course offers opportunity to handle the laboratory equipments and develop skills to determine elastic properties, thermal properties, surface tension which are relevant to the theory learnt in core courses.

COURSE OUTCOME

At the end of the Semester, the Students will be able to

CO 1 : be familiar with elasticity and various moduli of elasticity

CO 2 : calibrate the low range voltmeter

CO 3 : construct different types of waveforms

CO 4 : be familiar with spectroscopic techniques

CO 5 : experiment with semiconductor devices to understand their properties

LIST OF PRACTICALS

1. Thermal conductivity - Lee's method.
2. Joule's calorimeter – specific heat capacity of liquid.
3. Compound pendulum.
4. Torsional pendulum.
5. Young's modulus – uniform bending – microscope
6. Young's modulus – non uniform bending – telescope
7. Young's modulus - Cantilever depression.
8. Viscosity – Stoke's method.
9. Surface tension by capillary rise.

10. Potentiometer - calibration of low range voltmeter

11. Potentiometer - calibration of ammeter

12. Desauty's bridge

13. Spectrometer - Refractive index of prism

14. Newton's law of cooling

15. Young's modulus – uniform bending – telescope

16. Young's modulus – non uniform bending – microscope

17. L – Owen's bridge

18. Diode characteristics

19. Study of multimeter

20. Series Resonance

TEXT BOOKS

1. M.N.Srinivasan, S. Balasubramanian and R.Ranganathan, 2013 "A Text book of Practical Physics" (Sultan Chand & Sons)
2. Ouseph C.C., Rao U.J. and Vijayendran V., 2008, "Practical Physics and Electronics", S. Viswanathan (Printers and Publishers), Private Ltd., New Delhi.

REFERENCE BOOKS

1. Arora C.L., 2012, "B.Sc. Practical Physics", Twentieth Edition, S. Chand & Company Ltd., New Delhi.
2. Kakani S.L. and Shubhra K., 2015, "Applied Physics – Theory and Practicals", Viva Books Private Ltd., New Delhi.
3. Kakani S.L. and Shubhra K., 2011, "Engineering Practical Physics", CBS Private Ltd., New Delhi.
4. Manjeet S. and Anita D., 2011, "Applied Physics Theory and Experiments", Vayu Education of India, New Delhi.
5. Srivasta A. and Shukla R.K., 2006, "Practical Physics", New Age International Private Ltd., New Delhi.

Physics **Part III : Skill Based Paper 3**
Semester : II **Hours : 02 P/W 30 Hrs/II SEM**
Sub. Code : SP22 **Credit : 02**

PHYSICS IN EVERYDAY LIFE

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/Tutorial	ICT
	2	2	-	-	-

Preamble:
The scope of this course is to describe and discuss the physical principles that are behind the household appliances and the scientific issues in daily life. This is self-contained and comprehensive, starting from fundamental knowledge and progressing to their daily applications.

COURSE OUTCOME On the successful completion of the course students will able to	Unit	Hrs P/IIS
UNIT I CO1: Understand the basic working concepts of pressure cooker, microwave oven, refrigerator and toaster.	1	6
UNIT 2 CO2 : Develop thorough knowledge about construction and working principle of Geyser, Vacuum cleaner, Water purifier and Washing machine.	2	6
UNIT 3 CO3: Understand the classification of air conditioner, mechanism of DVD player, remote control and fluorescent tube.	3	6
UNIT 4 CO4 : Understand how the fax machine, printer and photocopier works	4	6
UNIT 5 CO5: Get a clear idea about transformer, relay, telephone and its uses which provide a pathway for the new scientific invention.	5	6

UNIT-I: KITCHEN
Pressure cooker- Microwave oven-Refrigerator and toaster.

UNIT-II : **BATHROOM**
Geyser-Vacuum cleaner-Water purifier and washing machine.

UNIT-III: HALL AND STUDY ROOM
Air conditioner (Any two type) - DVD player - Remote control and fluorescent tube.

UNIT – IV: OFFICE
Fax machine- Printer- Photocopier

UNIT –V: GENERAL
Transformer –Relay- Telephone -Fuse and lightning arrestor.

TEXT BOOK :
Study Material Prepared by the Department.

REFERENCES:
1. How things work volume1 & volume 2 relevant pages.
2. www.How stuffs work.com

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING

UNIT 1 KITCHEN		
Introduction to physics appliances in everyday life around us, working and principles of pressure cooker	**2**	**2 hours Lecture and Discussion**
Introduction and , working principles of microwave oven	**2**	**1 hours Lecture and 1 hour Discussion**
Brief knowledge about refrigerator and toaster.	**2**	**2 hours Lecture and Discussion**
UNIT II BATHROOM		
Meaning of Geyser and how it is working, vacuum cleaner	**2**	**2 hours lecture**
Principle of water purifier, working mechanism and its applications	**2**	**2 hours lecture**
Clear explanation about washing machine	**2**	**1 hours lecture 1 hour Discussion**
UNIT III HALL AND STUDY ROOM		
Air conditioner and its various types	**2**	**1 hours lecture 1 hour Discussion**
Introduction to DVD player and its working methods	**2**	**1 hours lecture 1 hour Discussion**
Basic principles applied in the remote control system and fluorescent tube	**2**	**1 hours lecture 1 hour Discussion**
UNIT IV OFFICE		
Working mechanism of fax machine and its applications.	**2**	**2 hours lecture**
Types of printer and their applications	**2**	**1 hours lecture 1 hour Discussion**
Thorough knowledge about Photocopier	**2**	**1 hours lecture 1 hour Discussion**
UNIT V GENERAL		
Transformer basic principle, working conditions and its applications.	**2**	**1 hours lecture 1 hour Discussion**
Relay and telephone	**2**	**1 hours lecture 1 hour Discussion**
Fuse and lightning arrestor	**2**	**1 hours lecture 1 hour Discussion**

Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	4	4	3	3	4	4	3	4	4	3	3.6
CO2	4	4	3	3	4	4	3	4	3	3	3.5
CO3	4	4	3	3	4	3	4	4	3	4	3.6
CO4	4	4	3	3	4	4	4	3	3	3	3.5

CO5	4	4	3	3	4	3	3	4	3	3	3.4
Mean Overall Score											3.52

Result: The Score for this Course is 3.38 (High Relationship)

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Mean Score of COs = $\frac{\text{Total of Values}}{\text{Total No. of Pos \& PSOs}}$

Mean Overall Score of COs = $\frac{\text{Total of Mean scores}}{\text{Total No. of COs}}$

ASSESSMENT RUBRICS

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%

Course Designer: Dr. P. INDRA DEVI,

Assistant Professor, Department of Physics.

Programme : Physics **Part III: Core**
Semester :III **Hours : 4 P/W 60Hrs P/S**
Sub. Code : P31 **Credits :4**

TITLE OF THE PAPER: ELECTROMAGNETISM

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT
	4	1	1	1	1

PREAMBLE:

- Explains the principle of electromagnetic induction
- Explain the principle and operation of electromagnetic devices
- Explain hysteresis and magnetic materials

COURSE OUTCOME At the end of the Semester, the Students will be able to	Unit	Hrs P/S
UNIT 1 CO1 • Recall basic laws of self induction and mutual induction, be familiar with self induction and mutual induction	1	13
UNIT 2 CO2: • Discuss the basic principle, working and applications of devices like Galvanometer	2	13
UNIT 3 CO3: • understand concisely and effectively complete information about alternating current and their concerned circuits	3	13
UNIT 4 CO4: • Categorize the types of magnetic materials on basis of and their corresponding theories.	4	13
UNIT 5 CO5: • Discuss the basic Maxwell's equations and electromagnetic waves	5	8

SYLLABUS

Unit I: ELECTRO MAGNETIC INDUCTION

Faraday's laws of electromagnetic induction - Self induction - Self inductance of a long solenoid - Determination of self inductance by Anderson's Bridge method - Mutual induction – Mutual inductance between two coaxial solenoids - Experimental determination of mutual Inductance - Coefficient of coupling.

Unit II: MAGNETIC EFFECT OF ELECTRIC CURRENT

Moving Coil Ballistic Galvanometer - Correction for Damping in Ballistic Galvanometer - Dead beat and Ballistic Galvanometers – Current and voltage sensitiveness of a moving coil galvanometer - Measurement of charge sensitiveness - Absolute capacitance of a capacitor - Comparison of capacitances using B.G.

Unit III: TRANSIENT PHENOMENA AND ALTERNATING CURRENT

Growth of current in a circuit containing a resistance and inductance- decay of current in an inductive circuit containing L and R - Charge and discharge of a capacitor through a resistor – Measurement of high resistance by leakage.
Mean Value of alternating current - R.M.S Value of an alternating current - LCR series resonance circuit , Acceptor circuit - Q factor - LCR Parallel resonance circuit , Rejector circuit

Unit IV: MAGNET1C PROPERTIES OF MATERIALS
Definitions of magnetic induction B, magnetization M, magnetic susceptibility and Magnetic permeability – Properties of Dia, Para and Ferro magnetic materials - Langevin's theory of Dia, Para magnetism – Weiss's theory of ferro magnetism - Hysterisis (only explanation)– Energy loss due to hysteresis (only explanation) – Importance of hysteresis curves.

Unit V :MAXWELL'S EQUATIONS AND ELECTROMAGNETIC WAVES
Fundamental laws of electromagnetism – Modified Ampere's law – Displacement current - Maxwell's equations in material media – Plane electromagnetic waves in free space – Poynting vector.

TEXT BOOKS: Electricity and Magnetism –R.Murugeshan, Ninth revised Edition, 2011; S.Chand& Co.,

REFERENCES:

- Electricity and Magnetism - Brijlal and Subramanian,Twentieth revised edn.
- Electricity Magnetism - Narayanamurti, Nagaratnam and Lakshminarayanan, Second revised edn.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT 1			
	Introduction to electromagnetic induction	2	Peer teaching
	Faraday's laws of electromagnetic induction	1	Tutorials
	Self induction	1	ICT
	Self inductance of a long solenoid	1	Lecture
	Determination of self inductance by Anderson's Bridge method	1	Lecture
	Mutual induction	2	ICT
	Mutual inductance between two coaxial solenoids	1	Lecture
	Experimental determination of mutual Inductance	1	Lecture
	Coefficient of coupling	1	Lecture
	Revision	2	Tutorials
UNIT 11			
	Introduction	2	ICT
	Moving Coil Ballistic Galvanometer	2	Peer Teaching
	Correction for Damping in Ballistic Galvanometer	1	Peer Teaching
	Dead beat and Ballistic Galvanometers	1	Tutorials
	Current and voltage sensitiveness of a moving	1	Lecture

	coil galvanometer		
	Measurement of charge sensitiveness	2	Lecture
	Absolute capacitance of a capacitor	1	Lecture
	Comparison of capacitances using B.G	1	Lecture
	Revision	2	Tutorials
UNIT III			
	Introduction to alternating current	2	ICT
	Growth of current in a circuit containing a resistance and inductance	1	Lecture
	decay of current in an inductive circuit containing L and R	1	Lecture
	Charge of a capacitor through a resistor	1	Lecture
	discharge of a capacitor through a resistor	1	Lecture
	Measurement of high resistance by leakage.	1	ICT
	Mean Value of alternating current and R.M.S Value of an alternating current	1	Peer teaching
	LCR series resonance circuit	1	Lecture
	Acceptor circuit , Rejector circuit and Q factor	1	Peer teaching
	LCR Parallel resonance circuit	1	Lecture
	Revision	2	Tutorials
UNIT IV			
	Introduction	2	Peer teaching
	Definitions of magnetic induction B, magnetization M, magnetic susceptibility and Magnetic permeability	1	Tutorials
	Properties of Dia, Para and Ferro magnetic materials	2	Peer teaching
	Langevin's theory of Para magnetism	1	Lecture
	Langevin's theory of Dia magnetism	1	Lecture
	Weiss's theory of ferro magnetism	1	Lecture
	Hysterisis (only explanation).	1	ICT
	Energy loss due to hysteresis (only explanation)	1	ICT
	Importance of hysteresis curves.	1	ICT
	Revision	2	Tutorials
UNIT V			
	Introduction	1	Peer teaching
	Fundamental laws of electromagnetism	1	Peer teaching
	Modified Ampere's law	1	Tutorials
	Displacement current	1	Lecture
	Maxwell's equations in material media	1	Lecture
	Plane electromagnetic waves in free space	1	Lecture
	Poynting vector	1	Lecture
	Revision	1	Tutorials

Course Outco	Programme Outcomes (Pos)	Programme Specific Outcomes (PSOs)	Mean scores

mes (Cos)														of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	
CO1								3	3	3	3	3	1	3	2.7
CO2								3	3	2	2	2	1	2	2.1
CO3								3	3	3	3	1	1	2	2.3
CO4								3	3	2	1	3	1	2	2.1
CO5								3	3	2	1	3	2	3	2.4
Mean Overall Score															2.3

Result: The Score for this Course is 2.3 (High Relationship)

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos\& PSOs}}$

Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%

Programme : B.Sc. **Part III: Core**
Semester : I **Hours : 4 P/W 60 Hrs P/S**
Sub. Code : P32 **Credits : 4**

TITLE OF THE PAPER: PROGRAMMING WITH C

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT
	4	2	1	1	-

PREAMBLE: To understand the basics and concepts involved in programming language. To emphasize logical thinking and to develop programming skill.

COURSE OUTCOME At the end of the semester, the students will be able to	Unit	Hrs P/S
CO1: define the basics of programming language	1	12
CO2: understand the concept of loops	2	12
CO3: describe arrays and strings	3	12
CO4: discuss the use of function and its classification	4	12
CO5: classify structure and union	5	12

SYLLABUS

UNIT I: INTRODUCTION

Basic structure of C Program - Character Set – C tokens-Keywords and identifiers, Constants, Variables, Data types - Declaration of Variables - Assigning values to variables -Defining Symbolic Constants. Arithmetic Operators - Relational, Logical, Assignment, Increment and Decrement, Conditional Operators- Arithmetic Expressions - Evaluation of expressions - Precedence of Arithmetic operators - Managing input and output Operations- Reading a character-Writing a character- Formatted input- formatted output.

UNIT II: LOOPS

Decision making and branching - Simple IF, IF-ELSE, Statements - ELSE - IF Ladder - Switch statement - Conditional Operator - GOTO Statement - Decision making and looping. WHILE, DO and FOR Statements - Jumps in Loops.

UNIT III: ARRAYS AND STRINGS

Arrays - One dimension & Two dimensions - Declaration and initialization of one and two dimensional arrays.

Declaring and initializing string variables - String handling functions.

UNIT IV: FUNCTION

Need for user defined functions – Elements of user defined functions-Definition of C functions – Return Values and their types – Function calls- Function declaration - Category of functions - No arguments and No return values - Arguments but No return values - Arguments with return values - Nesting of functions – Recursion – Passing arrays to functions.

UNIT V: STRUCTURE AND UNION

Defining a structure - Declaring structure variables - Accessing Structure members -Structure initialization - Arrays of Structures - Arrays within structure - Structures within structures –Unions.

LIST OF PROGRAMS FOR PROGRAMMING WITH C :

1. Program for temperature conversion - From °c to ºF or ºF to °c or to use any scientific formula – Simple type.
2. To reverse the digits of the given number.
3. To find the solution of a quadratic equation (Else-if ladder).
4. To find the largest of given three numbers (Nested if else)
5. To find the grade of the students (Switch statement)
6. To find the sum of digits of a given number (While)
7. To find the multiplication table (Do - While)
8. To find the factorial of a given number (For)
9. To sort the given numbers in ascending or descending order (1D – Array)
10. To find the transpose of matrix (2D- Array)
11. To find addition and subtraction of matrices (2D – Array)
12. To multiply the given two matrices (2D - Array)
13. To arrange a list of names in alphabetical order (String)
14. To find nCr = n! / r!(n-r) ! (Function call)
15. To find the factorial of the given number (Recursion)

TEXT BOOK:

Programming in ANSI C - E.Balagurusamy, 6th Edition - Tata Mc GrawHill Education Pvt. Ltd.

Unit – I : Ch. 1 – 1.8.
Ch. 2 – 2.2. – 2.8., 2.10.,2.11.
Ch. 3 – 3.1. – 3.7., 3.10. – 3.12.
Ch. 4 – 4.2. – 4.5.
Unit – II : Ch.5 – 5.1.- 5.4. , 5.6. – 5.9.
Ch.6 – 6.1. – 6.5.
Unit – III : Ch.7 – 7.1. – 7.6.
Ch. 8 – 8.2.,8.8.
Unit – IV : Ch.9 – 9.1.,9.2.,9.4. – 9.12., 9.15. – 9.17.
Unit – V : Ch.10 – 10.2. – 10.5., 10.8. – 10.10., 10.12.

REFERENCE BOOKS:

1. Programming Language C with Practicals - Ananthi Sheshasaayee & G.Sheshasaayee, Edition - 2001 (2nd Print)
2. Programming in C - P. Radha Ganesan & S.Ramasamy – Edition - 2004, Scitech Publications

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I			
	Basic structure of C Program - Character Set – C tokens-Keywords and identifiers, Constants, Variables, Data types - Declaration of Variables - Assigning values to variables -Defining Symbolic Constants	4	Lecture , peer teaching & GD

	Arithmetic Operators - Relational, Logical, Assignment, Increment and Decrement, Conditional Operators- Arithmetic Expressions - Evaluation of expressions - Precedence of Arithmetic operators element - Memory map and Addresses	4	Lecture , peer teaching & GD
	Managing input and output Operations- Reading a character-Writing a character- Formatted input- formatted output.	4	Lecture , peer teaching & GD
UNIT II			
	Decision making and branching - Simple IF, IF-ELSE, Statements - ELSE - IF Ladder -.	4	Lecture , peer teaching & GD
	Switch statement - Conditional Operator - GOTO Statement - Decision making and looping	4	Lecture , peer teaching & GD
	WHILE, DO and FOR Statements - Jumps in Loops	4	Lecture , peer teaching & GD
UNIT III			
	Arrays - One dimension & Two dimensions	4	Lecture , peer teaching & GD
	Declaration and initialization of one and two dimensional arrays.	4	Lecture , peer teaching & GD
	Declaring and initializing string variables - String handling functions.	4	Lecture , peer teaching & GD
UNIT IV			
	Need for user defined functions – Elements of user defined functions-Definition of C functions – Return Values and their types –	4	Lecture , peer teaching & GD
	Function calls- Function declaration - Category of functions - No arguments and No return values	4	Lecture , peer teaching & GD
	Arguments but No return values - Arguments with return values - Nesting of functions – Recursion – Passing arrays to functions	4	Lecture , peer teaching & GD
UNIT V			
	Defining a structure - Declaring structure variables	4	Lecture , peer teaching & GD
	Accessing Structure members -Structure initialization - Arrays of Structures	4	Lecture , peer teaching & GD
	Arrays within structure - Structures within structures –Unions	4	Lecture , peer teaching & GD

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean scores of
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	

											Cos
CO1	3	3	3	3	4	4	3	3	3	4	3.3
CO2	3	4	3	3	3	4	3	3	3	4	3.3
CO3	3	3	4	3	4	4	3	3	3	4	3.4
CO4	3	3	3	3	3	4	3	3	3	4	3.2
CO5	3	3	3	3	3	4	3	3	3	4	3.2
Mean Overall Score											3.28

Result: The Score for this Course is 3.28 (High Relationship)

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High
Mean Score of COs = Total of Value / Total No. of Pos & PSOs			Mean Overall Score of COs = Total of Mean Score / Total No. of COs		

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	30%	30%
UNDERSTANDING	30%	30%
APPLY	40%	40%

Course Designer: G.Selvarani Department of Physics

Programme : B.Sc **Part III: Core paper**
Semester : IV **Hours : 4 P/W 60Hrs P/S**

Sub. Code :P41 **Credits : 4**
TITLE OF THE PAPER: Mathematical Physics

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT
	4	3	-	1	-

PREAMBLE: The purpose of the *course* is to introduce students to *methods* of *mathematical physics* and to develop required *mathematical* skills to solve problems in *physics*.

COURSE OUTCOME At the end of the Semester, the Students will be able to	Unit	Hrs P/S
UNIT 1 CO1: define the Vector analysis (KR)	1	18
UNIT 2 CO2: solve the problems using Matrices (PI)	2	18
UNIT 3 CO3: interpret the Beta, Gamma and Dirac delta function (UI)	3	18
UNIT 4 CO4: explain about Laplace transform and its related problems (EI)	4	18
UNIT 5 CO5: solve the problems using Numerical methods (PI)	5	18

SYLLABUS

Unit – I: VECTOR ALGEBRA

Vectors- Addition of vectors- Rectangular resolution of a vector- Unit vector- position vector of a point-ratio formula-product of two vectors-Scalar, or dot product-Useful results-Work done as a scalar product-Vector product or cross product-Vector product expressed as determinant- Area of parallelogram-Moment of a force-Angular velocity- Vector function- Differentiation of vectors-Gradient of a scalar function- Geometrical meaning of gradient and normal- Divergence of a vector function- Green's theorem.

Unit - II: MATRIX

Introduction– Special Types of Matrices - Transpose of a Matrix – The Conjugate of a Matrix – Symmetric and Antisymmetric Matrices – Determinant of a Matrix – Adjoint of a Matrix – Invertible Matrices - Inverse of a matrix

Unit –III : GAMMA, BETA FUNCTION

Gamma function- Proof-Transformation of gamma function-Beta function– Evaluation of beta function – A property of beta function- Transformation of beta function– Relation between Beta and Gamma function- Proof

Unit – IV : LAPLACE TRANSFORM

Introduction – Laplace transform- Important formulae – Properties of Laplace transform- change of scale property (problem related to Laplace transform), Laplace transform of the derivative of f(t), Laplace transform of the derivative of order n.

Unit – V: NUMERICAL ANALYSIS

Introduction – Numerical Differentiation – Numerical Integration General quadrature formula for

equidistant values of argument x, The trapezoidal rule, Simpson's one – third rule, Simpson's three – eighth rule - Euler's rule,

Text Book:

1. Mathematical Physics – H.K.DASS, Dr. RAMA VERMA (Sixth Revised Edition, 2013)

Unit : I – 1.12, 1.5, 2.1,2.2,2.5,2.6,2.8,3.4 (theorem only)
Unit : III – 9.1-9.9
Unit : IV – 46.1-46.4,46.5 (Linear property), 46.8,46.9(Problem related to Laplace transform)

2. Mathematical Physics with Classical Mechanics – Sathya Prakash (SULTAN CHAND & SONS Sixth Revised edition 2012)

Unit :II – 2.1,2.5,2.6,2.7,2.9,2.11,2.15,2.16
Unit:V – 14, 14.4,14.5

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I	Vectors- Addition of vectors- Rectangular resolution of a vector- Unit vector- position vector of a point-ratio formula-product of two vectors-Scalar, or dot product-Useful results	4	Lecture & Tutorial
	Work done as a scalar product-Vector product or cross product-Vector product expressed as determinant- Area of parallelogram- Moment of a force- Angular velocity	4	Lecture & Tutorial
	Vector function- Differentiation of vectors-Gradient of a scalar function-	4	Lecture & Tutorial

	Geometrical meaning of gradient and normal- Divergence of a vector function- Green's theorem.		
UNIT II	Introduction– Special Types of Matrices - Transpose of a Matrix	4	Lecture & Tutorial
	The Conjugate of a Matrix –Symmetric and Antisymmetric Matrices	3	Lecture & Tutorial
	Determinant of a Matrix – Adjoint of a Matrix – Invertible Matrices - Inverse of a matrix	5	Lecture & Tutorial
UNIT III	Gamma function- Proof-Transformation of gamma function	4	Lecture & Tutorial
	Beta function– Evaluation of beta function – A property of beta function	4	Lecture & Tutorial
	Transformation of beta function– Relation between Beta and Gamma function- Proof	4	Lecture & Tutorial
UNIT IV	Introduction – Laplace transform- Important formulae – Properties of Laplace transform	4	Lecture & Tutorial
	change of scale property (problem related to Laplace transform),	3	Lecture & Tutorial
	Laplace transform of	5	Lecture & Tutorial

	the derivative of f(t), Laplace transform of the derivative of order n		
UNIT V	Introduction – Numerical Differentiation – Numerical Integration,	4	Lecture & Tutorial
	General quadrature formula for equidistant values of argument x, The trapezoidal rule, Simpson's one – third rule	5	Lecture & Tutorial
	Simpson's three – eighth rule - Euler's rule	3	Lecture & Tutorial

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	4	3	4	3	3	4	3	3	5	3.5
CO2	5	3	4	3	4	3	3	4	3	4	3.6
CO3	3	3	3	4	3	3	5	4	3	3	3.4
CO4	3	3	4	3	3	3	4	4	3	4	3.4
CO5	4	3	3	4	4	3	3	4	4	3	3.5
Mean Overall score											3.48

Result: The Score for this Course is 3.48 (High Relationship)

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos \& PSOs}}$

Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	30%	30%
UNDERSTANDING	40%	40%
APPLY	30%	30%

Course Designer: M.Mahalakshmi Department of Physics.

Programme : UG Physics **Part III: Core**
Semester : VIII **Hours : 4 P/W 60Hrs P/S**
Sub. Code : P42 **Credits : 4**

TITLE OF THE PAPER: PHYSICAL AND LASER OPTICS

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL
	4	1	2	1

PREAMBLE:
Knowing characteristics of light and laser, measuring various spectral properties of light by different apparatus and describing applications of laser

COURSE OUTCOME At the end of the Semester, the Students will be able to	Unit	Hrs P/S
UNIT 1 CO1: Illustrate the interference of light and find refractive index and wavelength of light	1	14
UNIT 2 CO2: Explain diffraction and spectral characteristics of light	2	15
UNIT 3 CO3: Discuss the production and analysis of various polarization of light	3	14
UNIT 4 CO4: Describe the principle, properties and types of laser optics	4	9
UNIT 5 CO5: Apply laser principle into various fields	5	8

SYLLABUS

Unit – I : INTERFERENCE

Interference of light waves - Interferometry –Determination of refractive index of a light by Newton's rings - Michelson interferometer - determination of wavelength of monochromatic light – Determination of difference between two doublets – Jamin's interferometer – Rayleigh's refractometer -measurement of refractive index of gas

Unit – II : DIFFRACTION

Diffraction of light waves – Fresnel's half period zones - Explanation of approximate rectilinear propagation of light – Zone plate – Explanation for diffraction at a straight edge - Fraunhofer diffraction at a single slit - Double slit – Diffraction grating - Absent spectra - Dispersive power of grating - Overlapping of spectral lines - Determination of wavelength of spectral lines using grating - Resolving power of a diffraction grating

Unit – III : POLARISATION

Polarisation of light - Double refraction - Nicol prism - Dichroism - QWP -HWP - Theory of plane polarized light, elliptically polarized light and circularly polarised light - Production and analysis of plane polarised light, circularly polarised light and elliptically polarised light -Babinet's compensator

Unit – IV: LASER OPTICS

Salient features of laser - Principles of laser, Population inversion, pumping - Einstein's A and B coefficients -Stimulated emission, population inversion –properties of laser- resonators – Ruby laser –

He-Ne laser

Unit – V : APPLICATIONS OF LASER

General & meditional applications of laser, lidar, Holography, Principle - Recording of the hologram and viewing of the image from a hologram –Applications of holography

TEXT BOOK :

Optics and spectroscopy – R.Murugesan, Kiruthiga Sivaprasath, 8 th revised edition, 2012, S.Chand

UNIT-I: CHAPTER –2.1, 2.2, 2.10 - 2.14
UNIT-II : CHAPTER -3.1- 3.3, 3.7, 3.10- 3.15, 3.17, 3.24
UNIT-III : CHAPTER -4.1, 4.5, 4.8, 4.10, 4.12 -4.14, 16.8, 31.3
UNIT-IV: CHAPTER -5.13 - 5.15, 5.17, 12.1, 12.2
UNIT-V : CHAPTER -9.1, 9.3, 39.2(4), 39.4, 39.5

Reference:
1. Optics and Spectroscopy –Brijlal & Subramanian, 2006 edition, S.Chand &Co.
2. A Text book of Physics- R.Murugesan, 2006 edition, S.Chand &Co.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
	UNIT 1		
	Interference of light waves, Interferometry	2	Lecture, GD
	Determination of refractive index of a light by Newton's rings	2	Peer Teaching
	Michelson interferometer	2	Peer Teaching
	determination of wavelength of monochromatic light	2	Peer Teaching
	Determination of difference between two doublets	2	Peer Teaching
	Jamin's interferometer	1	Peer Teaching
	Rayleigh's refractometer - measurement of refractive index of gas	3	Peer Teaching, Tutorial
	UNIT 11		
	Diffraction of light waves, Fresnel's half period zones	2	Lecture
	Explanation of	2	Peer Teaching

	approximate rectilinear propagation of light		
	Zone plate	2	Peer Teaching, Tutorial
	Explanation for diffraction at a straight edge	1	Peer Teaching
	Fraunhofer diffraction at a single slit	1	Peer Teaching
	Double slit	1	Peer Teaching
	Diffraction grating	1	Peer Teaching
	Absent spectra	1	Lecture
	Dispersive power of grating	1	Lecture
	Overlapping of spectral lines	1	Lecture
	Determination of wavelength of spectral lines using grating	1	Lecture
	Resolving power of a diffraction grating	1	Lecture
UNIT III			
	Polarisation of light - Double refraction	1	Lecture
	Nicol prism	1	Peer Teaching
	Dichroism , QWP ,HWP	2	Peer Teaching
	Theory of plane polarized light, elliptically polarized light and circularly polarised light	4	Peer Teaching
	Production and analysis of plane polarised light, circularly polarised light and elliptically polarised light	3	Peer Teaching
	Babinet's compensator	3	Peer Teaching, Tutorial
UNIT IV			
	Salient features of laser, properties of laser	1	Lecture,GD
	Principles of laser, Population inversion, pumping	2	Peer Teaching, Tutorial

	Einstein's A and B coefficients	2	Peer Teaching
	Stimulated emission, population inversion	1	Peer Teaching
	Resonators	1	Peer Teaching
	Ruby laser	1	Peer Teaching
	He-Ne laser	1	Peer Teaching
UNIT V			
	General & meditional applications of laser,	1	Lecture, GD
	lidar,	2	Peer Teaching, Tutorial
	Holography, Principle -Recording of the hologram and viewing of the image from a hologram	3	Peer Teaching
	Applications of holography	2	Lecture, GD

Course Outcomes (Cos)	Programme Outcomes (Pos)					Programme Specific Outcomes (PSOs)						Mean scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	
CO1	3	4	4	3	3	4	4	4	3	3	3	3.46
CO2	3	4	4	3	3	4	4	4	3	3	3	3.46
CO3	3	3	4	3	3	4	3	4	3	3	3	3.27
CO4	3	3	4	4	4	4	3	4	4	4	4	3.73
CO5	3	4	4	4	4	4	3	3	4	4	4	3.73
Mean Overall Score												3.53

Result: The Score for this Course is 3.53 (High Relationship)

Programme : B.Sc., Physics **Part III : Skill Based Paper- 3**
Semester : III & IV **Hours : 01 P/W 30 Hrs/III&IV SEM**
Sub. Code : SP43 **Credits : 02**

ASTROPHYSICS AND COSMOS

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/Tutorial	ICT
	1	1	-	-	-

Preamble:
The course is designed to provide students of physics their first pedagogical introduction to the Universe. Though discussions of the physics underlying diverse astrophysical processes and phenomena, the aim of this course is to motivate students about physics at large-scales, and provide them with the basic theoretical tools to explore the universe.

COURSE OUTCOME On the successful completion of the course students will able to	Unit	Hrs P/III&IVSem
UNIT 1 CO1: describe the features of objects in the Solar system giving details of similarities and differences between these objects. Understand the fundamental concepts of the sky, the stars and motion of planets.	1	6
UNIT 2 CO2: understand the presently accepted formation theories of the solar system based upon the observational and physical constrains.	2	6
UNIT 3 CO3 :understanding the basic properties of the Sun and other Stars	3	6
UNIT 4 CO4 : understand the concept of stellar distance and magnitude of star light. Also students extend their understanding of physical concepts that apply to the study of block hole	4	6
UNIT 5 CO5 : explain the evolution of expanding universe using concepts of Big Bang and observational evidence.	5	6

UNIT – I: EXPLORING THE SKY
The sky: The Stars-The celestial sphere – The cycles of the sun – The motion of the planets (Kepler's). The cycles of the moon: The phases of the moon – The tide – Lunar eclipses – Solar eclipses.

UNIT – II : OBSERVATIONAL ASTRONOMY
Astronomical observations – Radio telescope - Classes of galaxies

UNIT – III : THE STARS
The sun – Our star – The solar activity – The solar atmosphere – Nuclear fusion in the sun.

UNIT – IV : STELLAR OBJECTS
Stellar distance – Magnitude of star light – Evolutionary stages of stars – Fate of stars, Black holes in space.

UNIT – V : ORIGIN OF COSMOS
Cosmological principle – The Bigbang – Hubble's law expanding Universe – Steady state Universe.

TEXT BOOK:
Study Material Prepared by the Department.

REFERENCE BOOKS

1. Astrophysics-Stars and galaxies – K.D.Abhyankar, 1992
   Tata McGraw Hill Publishing,New Delhi.
2. Foundation of astronomy - Michael A. Seeds - 6th Edition.
3. Universe – William J. Kaufmann- 4th Edition,1994.

4. New horizons in astronomy - John C. Brandt and Stephen P. Maran. Books/Wle 1972.
5. Exploration of the Universe -George O.Abell, 1986, Saundus College Publishing.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT 1: EXPLORING THE SKY			
	The sky, The stars , celestial sphere	**2**	**2 hours Lecture and Discussion**
	Cycles of the Sun, Motion of the planets	**2**	**1 hours Lecture and 1 hour Discussion**
	The cycles and Phases of Moon	**1**	**1 hours Lecture**
	Lunar eclipses and Solar eclipses	**1**	**1 hours Lecture**
UNIT II : OBSERVATIONAL ASTRONOMY			
	Astronomical observations	**2**	**1 hours lecture 1 hour Discussion**
	Radio telescope	**2**	**1 hours lecture 1 hour Discussion**
	Classes of Galaxies	**2**	**1 hours lecture 1 hour Discussion**
UNIT III : THE STARS			
	The sun, star, solar activity	**2**	**1 hours lecture 1 hour Discussion**
	The Solar atmosphere	**2**	**2 hours lecture**
	Nuclear fusion in the sky	**2**	**1 hours lecture 1 hour Discussion**
UNIT IV : STELLAR OBJECTS			
	Stellar distances, Magnitude of star light	**2**	**1 hours lecture 1 hour Discussion**
	Evolutionary stages of stars, Fate of stars	**2**	**1 hours lecture 1 hour Discussion**
	Black holes in Space	**2**	**1 hours lecture 1 hour Discussion**
UNIT V : ORIGIN OF COSMOS			
	Cosmological principle	**2**	**1 hours lecture 1 hour Discussion**
	The Bigbang theory	**2**	**1 hours lecture 1 hour Discussion**
	Hubble's law expanding universe, Steady state Universe	**2**	**1 hours lecture 1 hour Discussion**

Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	

CO1	4	3	3	3	3	4	3	3	4	4	3.4
CO2	4	3	3	3	3	4	3	3	4	3	3.3
CO3	4	3	3	4	3	4	3	4	3	4	3.5
CO4	4	3	3	4	3	4	3	3	3	3	3.3
CO5	4	3	3	4	3	3	3	3	4	4	3.4
Mean Overall Score											3.38

Result: The Score for this Course is 3.38 (High Relationship)

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Mean Score of COs = $\frac{\text{Total of Values}}{\text{Total No. of Pos \& PSOs}}$

Mean Overall Score of COs = $\frac{\text{Total of Mean scores}}{\text{Total No. of COs}}$

ASSESSMENT RUBRICS

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%

Course Designer: Dr. P. N,NIRMALA, Assistant Professor, Department of Physics.

Programme : B.Sc. **Part III: Practical**
Semester : III & IV **Hours :2 P/W 30Hrs P/S**
Sub. Code : PP2 **Credits : 2**

TITLE OF THE PAPER: MAJOR PRACTICAL – PAPER – II

Pedagogy	**Hours**	**Lecture**	**Peer Teaching**	**GD/ Vedos/Tutorial**	**P**
	2		-		2

PREAMBLE: This course is able to develop practical knowledge by applying the experimental methods to correlate with the Physics theory. 2. To learn the usage of electrical and optical systems for various measurements. 3. Apply the analytical techniques and graphical analysis to the experimental data. 4. To develop intellectual communication skills and discuss the basic principles of scientific concepts in a group.

COURSE OUTCOME At the end of the Semester, the Students will be able to		
CO1: apply the procedures and techniques for the experiments.		
CO2: use the different measuring devices and meters to record the data with precision .		
CO3: show the basic working condition of the experiment.		
CO3: apply the mathematical concepts/equations to obtain quantitative results.		
CO4: understand the standard value of the results and the applications.		
CO5:communicate scientific information in oral, written and graphical formats.		
CO6: develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results		
CO7: identify the basic concepts needed to develop a program		

LIST OF PRACTICALS

1. LCR Parallel resonance
2. BH determination – field coil
3. AC frequency - Sonometer
4. MG – figure of merit
5. B.G – figure of merit
6. BG – comparison of capacitances
7. Air wedge – Thickness of thin wire
8. Dispersive power of prism – spectrometer
9. Grating – normal incidence – spectrometer
10. Grating – minimum deviation – spectrometer
11. Boltzmann's constant
12. a) Program for temperature conversion -from °c to ^{o}F or ^{o}Fto °c
    b) To find the solution of a quadratic equation (else-if ladder).

13. a) To find the largest of given three numbers (nested if else)
    b) To find the sum of digits of a given number (while)

14. a) To find the factorial of a given number (for)
    b) To sort the given numbers in ascending or descending order (1D – array)

15. a) To find the multiplication table (Do-While)
    b)To arrange a list of names in an Alphabetical order (string)

16. To reverse the digits of the given number

17. To find the grade of the students

18. To generate a electric bill

Books

1. C.L. Arora, Practical physics, S. Chand Publication
2. B.L. Worsnop and H. T. Flint , Advanced Practical Physics, Asia Publishing House
3. A Textbook of Practical Physics, M.N.Srinivasan, S.Balasubramanian, R.Ranganathan S.Chand&Sons Publications
4. Programming in ANSI C - E.Balagurusamy, 6th Edition - Tata McGrawHill Education Pvt. Ltd.

Course designer: R. Vijayalakshmi Department of physics

Programme : B.Sc | **Part III: Core**
Semester : III | **Hours : 4 P/W 60Hrs P/S**
Sub. Code : P51 | **Credits: 4**

TITLE OF THE PAPER: BASIC ELECTRONICS

Pedagogy	Hours	Lecture	Peer Teaching	GD/ Videos/Tutorial	ICT
	4	3	-	-	1

PREAMBLE: To enable the students to acquire a thorough knowledge of important network theorems involved in electronic circuits and fundamentals of Basic Electronic components and their applications. To explain the students the different types of transistor amplifiers, oscillators and multivibrators. To provide the students a thorough knowledge of modulation in communication.

COURSE OUTCOME At the end of the Semester, the Students will be able to	**Unit**	**Hrs P/S**
CO 1:understand Kirchhoff's Laws and various network theorems	1	12
CO 2: describe the function of various diodes and their applications	2	12
CO 3: distinguish between BJT and FET and able to explain the working of amplifiers	3	12
CO 4: explain the working of oscillators and multivibrators	4	12
CO 5: describe the principle and types of modulation	5	12

SYLLABUS

UNIT – I : KIRCHHOFF'S LAWS AND NET WORK THEOREMS

Kirchhoff's Laws - Kirchhoff's Current Laws - Kirchhoff's Voltage Laws - Thevenin's Theorem - Procedure for Appling the Thevenin's Theorem - Norton's Theorem - Procedure for Appling the Norton's Theorem - Superposition Theorem.

UNIT – II : PN JUNCTION DIODE AND SPECIAL PURPOSE DIODES

V-I Characteristic of a PN Junction Diode - Forward and Reverse Characteristics - Diode Current Equation - Zener Diode - Reverse Characteristic of a Zener Diode - Applications - Schottky Diode - Applications - PIN Diode – Applications - Light Emitting Diode - Applications.

UNIT – III : TRANSISTORS AND AMPLIFIERS

Transistor in common Emitter Configuration - Characteristic of a Transistor in Common-Emitter Configurations - Field-Effect Transistor - Characteristic of JFET - Common-Emitter Transistor amplifier- RC Coupled Amplifier – Calculation of Voltage Gain of RC Coupled Amplifier- frequency response of RC Coupled Amplifier

UNIT - IV : OSCILLATORS AND MULTIVIBRATORS

Principle of feedback - Advantages and Disadvantages of negative feedback – Sinusoidal Oscillators –Comparison Between an Amplifier and an Oscillators - Classification of Oscillators -

The Barkhausen Criterion - Hartley Oscillator- Colpitts Oscillators – Phase shift Oscillators – Multivibrators – types-Astable Multivibrators.

UNIT – V : MODULATION AND DEMODULATION

Modulation – Types – Amplitude Modulation – Modulated power output – Frequency Modulation – Expression for frequency modulated voltage – FM Receiver – Transmission of Radio waves – AM Receiver – Characteristic of a receiver – Demodulation – FM Transmitter.

TEXT BOOKS :

1. A Text Book of Applied Electronics- Dr.R.S.SEDHA- S.CHAND & Company Pvt . Ltd. Reprint 2015.

UNIT-I: Chapter 5: 5.1 – 5.9

UNIT-II: Chapter 12 & 13 :12.1–12.5, 13.2, 13.3, 13.6, 13.15, 13.16, 13.19 – 13.21,13.23

UNIT-III: Chapter 15, 16, 24 & 26: 15.6-15.8,16.1-16.3,16.6,16.7, 24.1-24.4, 26.4-26.6.

UNIT-IV: Chapter 29,31&32: 29.1-29.3,31.1-31.3,31.9,31.14,31.15,31.26,32.6-32.8.

2. ANALOG ELECTRONICS AND DIGITAL ELECTRONICS – G.JOSE ROBIN & A.UBALDRAJ, Indira Publication First Edition: May 2008.

UNIT-V : Chapter 5 : Page No : 249-262, 264-275, 279-280

BOOKS FOR REFERENCE :

1. Basic Electronics Solid State - B.L. Theraja, IV Edition S. Chand & Co., 1989
2. Principles of Electronics - V.K. Mehta, S.Chand & Co., Ltd., Reprint, 1993.
3. Electronics – II - G. Jose Robin & Ubald Raj, Indira Publication, First Edition: May 2008

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I	Kirchhoff's Laws - Kirchhoff's Current Laws - Kirchhoff's Voltage Laws.	4	Lecture & ICT
	Thevenin's Theorem - Procedure for Appling the Thevenin's Theorem.	4	Lecture & ICT
	Norton's Theorem- Procedure for Appling the Norton's Theorem - Superposition Theorem.	4	Lecture & ICT
UNIT II	V-I Characteristic of a PN Junction Diode - Forward and Reverse Characteristics - Diode Current Equation.	4	Lecture & ICT
	Zener Diode - Reverse Characteristic of a Zener Diode- Applications.	3	Lecture & ICT
	Schottky Diode - Applications - PIN Diode – Applications - Light Emitting Diode - Applications.	5	Lecture & ICT
UNIT III	Transistor in common Emitter Configuration - Characteristic of a Transistor in Common-Emitter Configurations-Field-Effect Transistor	6	Lecture & ICT

	- Characteristic of JFET .		
	Common-Emitter Transistor amplifier- RC Coupled Amplifier – Calculation of Voltage Gain of RC Coupled Amplifier- frequency response of RC Coupled Amplifier.	6	Lecture & ICT
UNIT IV	Principle of feedback - Advantages and Disadvantages of negative feedback – Sinusoidal Oscillators- Comparison Between an Amplifier and an Oscillators.	4	Lecture & ICT
	Classification of Oscillators - The Barkhausen Criterion - Hartley Oscillator- Colpitts Oscillators – Phase shift Oscillators.	5	Lecture & ICT
	Multivibrators–types-Astable Multivibrators.	3	Lecture & ICT
UNIT V	Modulation – Types – Amplitude Modulation – Modulated power output – Frequency Modulation – Expression for frequency modulated voltage.	6	Lecture & ICT
	FM Receiver – Transmission of Radio waves – AM Receiver – Characteristic of a receiver – Demodulation – FM Transmitter.	6	Lecture & ICT

Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	4	4	4	3	3	4	4	3	2	3	3.4
CO2	4	4	3	2	3	4	4	3	2	3	3.2
CO3	4	4	3	3	3	4	4	3	3	4	3.5
CO4	4	3	3	3	4	4	4	2	3	4	3.4
CO5	4	4	3	3	3	4	4	2	2	4	3.3
Mean Overall Score											3.36

Result: The Score for this Course is 3.36 (High Relationship)

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0

Quality	Very Poor	Poor	Moderate	High	Very High
Total of Value Mean Score of COs = ---------- Total No. of Pos& PSOs			Total of Mean Score Mean Overall Score of COs =---------- Total No. of COs		

BLOOM'S TAXANOMY	**INTERNAL**	**EXTERNAL**
KNOWLEDGE	40%	40%
UNDERSTANDING	40%	40%
APPLY	20%	20%

Course Designer: Dr**.** Mrs. N.NAGARANI,Department of Physics

Programme : B.Sc., PHYSICS **Part III: MAJOR Core/Allied/Elective : core**
Semester : V **Hours : 5 P/W 75Hrs P/S**
Sub. Code : P52 **Credits : 5**

TITLE OF THE PAPER: ATOMIC PHYSICS

Pedagogy/unit	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT
	15	9	3	1	2

PREAMBLE:
Understand and apply the principles of crystallography in research studies and the photo electric devices with their performance. Acquire knowledge on design a plane in a crystal by Miller Indices.

COURSE OUTCOME At the end of the Semester, the Students will be able to	Unit	Hrs P/S
UNIT 1 CO1: VECTOR ATOM MODEL To summarize the characteristics of Vector atomic model, to explain the structure and spectra of simplest atoms using the quantum hypothesis.	1	15
UNIT 2 CO2: ATOMIC SPECTRA To demonstrate and solve how the energy absorbed by atoms in discrete quanta and to discuss the effect of normal and anomalous Zeeman effect.	2	16
UNIT 3 CO3: X – RAYS. To study the characteristics of X-rays spectra and to solve problems using Moseley's law . To examine and understand the process of scattering of X-rays by light elements (Compton effect).	3	15
UNIT 4 CO4: CRYSTALLOGRAPHY To analyze the various types of imperfections that occur in crystals and to apply the principles of crystallography in research studies.	4	15
UNIT 5 CO5: PHOTO ELECTRIC EFFECT To demonstrate and describe the photoelectric effect and to list the performance and applications of photoelectric devices. To formulate the Einstein's light quanta hypothesis.	5	14

SYLLABUS : ATOMIC PHYSICS

UNIT I: VECTOR ATOM MODEL

The Vector atom model - Quantum numbers associated with the Vector Atom Model - coupling schemes – The Pauli's exclusion principle –Some Examples of Electronic configuration with their Modern Symbolic Representations - Magnetic dipole Moment Due to orbital motion of the Electron - The Stern and Gerlach Experiment.

UNIT II: ATOMIC SPECTRA

Optical spectra (Fine structure of sodium D line) - Zeeman effect- Larmor's Theorem - Quantum mechanical explanation of Normal Zeeman effect- Anomalous Zeeman Effect - Paschen-Back effect - Stark effect (qualitative only).

UNIT III: X RAYS

Production of X-rays - Absorption of X-rays - Bragg's law – The Bragg X-ray Spectrometer – X-Ray spectra - Characteristic X-Rays Spectrum – Moseley's law – Compton's Scattering(Experimental Verification).

UNIT IV: CRYSTALLOGRAPHY

Types of solids – Bravais Lattice – Miller indices – Spacing Between three dimensional lattice

plane – Element of symmetry – SC,BCC, FCC structure- Calculation of lattice constant – Point group – Unit cell – Brillouin Zones - Reciprocal lattices to SC,BCC,FCC lattices.

UNIT V: PHOTO ELECTRIC EFFECT

Introduction- Laws of photoelectric emission- Experimental Investigations on the Photo electric Effect- Einstein's Photo Electric equation- Photoelectric Cells

TEXT BOOKS:

1. Modern Physics – R. Murugeshan – XVIII (18th) Revised Edition 2016 – S.Chand & Co., Ltd.

UNIT-I – (4.12-4.15), 4.17, 4.18, 4.20
UNIT –II – 4.21, (4.23-4.28)
UNIT – III – (5.1- 5.6), 5.9, 5.13
UNIT IV – (25.1-25.10), (25.19- 25.23)
UNIT-V – 6.1, (6.4-6.6)

BOOKS FOR REFERENCE:

1.	Atomic Physics	Satyaprakash – Latest revised Edition after 2000 Published by Ratan Prakashan, Mandir.
2.	Nuclear Physics and Particle Physics	Satyaprakash ,2005 Edition – Sultan Chand & Sons.
3	Concept of Modern Physics	Arthur Beiser, II Edition, McGraw Hill Kogakusha Ltd.
4	Modern Physics	Richtmyer, Kennard & Cooper -VI Edition, McGraw Hill Book Company.
5	https://youtu.be/vEwjwUxW0kQ	

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT 1 : **VECTOR ATOM MODEL**			
	Introduction to structure of the atom – atom model -the Vector atom model	**3**	Motivation by asking questions – peer group discussion and by lecturing through ICT (power point presentation)
	Quantum numbers associated with the Vector Atom Model - coupling schemes	**3**	Lecturing and by group discussion
	The Pauli's exclusion principle –Some Examples of Electronic configuration with their Modern Symbolic Representations	**5**	Peer group discussion and by framing electronic configuration for some elements using periodic table
	Magnetic dipole Moment Due to orbital motion of the Electron - The Stern	**4**	Lecturing with discussion and deriving the expression.

	and Gerlach Experiment.		
UNIT II : **ATOMIC SPECTRA**			
	Introduction to atomic spectra - Various types of spectra – Origin of spectra - Optical spectra (Fine structure of sodium D line)	**5**	Lecture
	Zeeman effect- Larmor's Theorem	**4**	Lecturing, deriving the theroem and Solving the problem
	mechanical explanation of Normal Zeeman effect- Anomalous Zeeman Effect - Paschen-Back effect - Stark effect (qualitative only).	**7**	Lecturing with ICT
UNIT III : **X RAYS**			
	Introduction - Production of X-rays - Absorption of X-rays - Bragg's law – The Bragg X-ray Spectrometer	**5**	Lecturing with group discussion
	X-Ray spectra - Characteristic X-Rays Spectrum – Moseley's law.	**5**	Seminar and given problem for solving.
	Compton's Scattering (Experimental Verification).	**5**	Lecture
UNIT IV : **CRYSTALLOGRAPHY**			
	Types of solids – Bravais Lattice – Miller indices – Spacing Between three dimensional lattice plane Unit cell – Brillouin Zones - Reciprocal lattices to SC,BCC,FCC lattices.	**5**	ICT

	Element of symmetry – SC,BCC, FCC structure- Calculation of lattice constant – Point group	**5**	ICT
	Unit cell – Brillouin Zones - Reciprocal lattices to SC,BCC,FCC lattices.	**5**	ICT and indexing
UNIT V : **PHOTO ELECTRIC EFFECT**			
	Introduction- Laws of photoelectric emission- Experimental.	**5**	Seminar with ICT
	Investigations on the Photo electric Effect- Einstein's Photo Electric equation	**5**	Seminar with ICT and solving the problem.
	Photoelectric Cells	**4**	Seminar with ICT

Course Outcomes (Cos)	Programme Outcomes (Pos)					Programme Specific Outcomes (PSOs)						Mean scores of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	
CO1	3	4	3	4	3	3	4	4	3	3	3	3.36
CO2	3	4	4	4	3	3	3	3	3	4	3	3.36
CO3	3	4	3	3	3	4	3	4	3	3	3	3.27
CO4	3	4	3	4	3	4	3	4	3	4	4	3.55
CO5	4	4	4	4	4	4	4	4	4	4	4	4.00
Mean Overall Score												3.51

Result: The Score for this Course is 3.51 (High Relationship)

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High
Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos \& PSOs}}$			Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$		

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL

KNOWLEDGE	40%	40%
UNDERSTANDING	30%	30%
APPLY	30%	30%

Course Designer : Dr. Mrs. SANTHI. Department of physics

Programme : B.Sc. **Part III: Elective**
Semester : V **Hours : 5P/W 75Hrs P/S**
Sub. Code : EP51 **Credits :**

TITLE OF THE PAPER: BIOMEDICAL INSTRUMENTATION

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT
	5	3	-	1	1

PREAMBLE: To know the parts of biomedical instruments.To understand the use of them in the recording system and physiological assist devices.

COURSE OUTCOME At the end of the Semester, the students will be able to	Unit	Hrs P/S
CO1:list the electrode material and types of electrodes and transducers	1	15
CO2: describe biomedical amplifiers and to analyse biosignal	2	15
CO3: explain the characteristics of the recording system and the types of physiological assist devices	3	15
CO4: apply diathermy technique	4	15
CO5:discuss about the diagnostic instruments	5	15

SYLLABUS

UNIT I: BIOPOTENTIAL ELECTRODES AND TRANSDUCERS

Transport of ions through cell membranes- Bio electric potentials- Design of medical instruments – Component of biomedical instrument systems- Electrodes-Half cell potential-Electrode paste-Electrode material-Types of electrodes (Micro electrodes, Depth and needle electrodes, Surface electrodes) - transducers-(magnetic induction type, photovoltaic type, thermoelectricity type, strain guage type, pressure transducers only).

UNIT II: BIOSIGNAL ACQUISITION

Biomedical preamplifier- Isolation amplifier- Instrumentation amplifier-Bridge amplifier-(voltage amplifier only)- Line driving amplifier- Current amplifier- Mechanical chopper amplifier- Bio-signal analysis (analog and digital methods-signal to noise improvement- amplitude measurement).

UNIT III: BIO POTENTIAL RECORDERS

Characteristics of the recording systems- Electro Cardio Graphy (ECG) – Introductory ideas about Electro Encephalography, Electromyography, Electroretinography - Accuracy of recorders - Pace makers (external and internal type of stimulation) – Batteries (Lithium cell only) – Artificial heart valves, Heart – Lung machine – Kidney machine (Block diagram only).

UNIT IV: DIATHERMY AND OXYMETERS

Surgical diathermy – Shortwave diathermy – Microwave diathermy – Ultrasonic diathermy – Ventilators (Servo – Controlled with microprocessor based only) – Anaesthesia machine -Vitro oximetry and Vivo oximetry only - Blood cell counter - (laser based blood cell counter only) – Electron Microscope.

UNIT V: DIAGNOSTIC INSTRUMENTS

Blood flow meters (Electromagnetic blood flow meter, ultrasonic blood flow meter, Recording fetal heart movements and blood circulation using Doppler ultrasonic method), Gas analysers: (infra red gas analysers, para magnetic oxygen analyser only).

TEXT BOOKS:

1. Bio Medical Instrumentation - Dr. M.Arumugam
   Edition II – 1994 – Mc Graw Hill.

Unit – I : Ch. 1 – 1.4., 1.6., 2.2.-2.4., 2.4.1. -2.4.7.,2.5.,2.5.1,2.5.2.,2.5.4.,2.5.5.,2.5.9.
Unit – II : Ch. 3 – 3.1. – 3.3., 3.3.1.,3.4.,3.5.,3.5.1.,3.6. – 3.8.,3.8.1.,3.9.,3.9.1.-3.9.3.
Unit–III:Ch.4. – 4.2.,4.3.,4.3.1.-4.3.5.,4.4.,4.4.2.,4.4.4.,4.4.5.,4.5.,4.5.1.,4.5.2.,4.6.,4.7.
Ch.5. – 5.2.,5.2.1.,5.2.2.,5.3.2.,5.4.,5.4.1.-5.4.4.,5.7.,5.7.2.,5.8.,5.8.1.,5.8.2.
Unit–IV: Ch. 6. – 6.2. – 6.5.,6.8.,6.9.,6.15.,7.2.,7.3.
Unit–V : Ch.6. – 6.10.,6.10.1.,6.10.2.((i),(ii),b),6.13.,6.13.1.,6.13.2.

REFERENCES:

Handbook of Biomedical Instrumentation – R.S.Khandpur – Second Edition,
Mc Graw Hill.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I			
	Transport of ions through cell membranes- Bio electric potentials- Design of medical instruments – Component of biomedical instrument systems	5	Lecture , Video & ICT
	Electrodes-Half cell potential-Electrode paste- Electrode material-Types of electrodes (Micro electrodes, Depth and needle electrodes, Surface electrodes)	5	Lecture , Video & ICT
	transducers-(magnetic induction type, photovoltaic type, thermoelectricity type, strain guage type, pressure transducers only)	5	Lecture , Video & ICT
UNIT II			
	Biomedical preamplifier- Isolation amplifier- Instrumentation amplifier	5	Lecture , Video & ICT
	Bridge amplifier-(voltage amplifier only)- Line driving amplifier- Current amplifier	5	Lecture , Video & ICT
	Mechanical chopper amplifier- Bio-signal analysis (analog and digital methods-signal to noise improvement- amplitude measurement)	5	Lecture , Video & ICT
UNIT III			
	Characteristics of the recording systems-	5	Lecture , Video & ICT

	Electro Cardio Graphy (ECG) – Introductory ideas about Electro Encephalography		
	Electromyography, Electroretinography - Accuracy of recorders - Pace makers (external and internal type of stimulation) – Batteries (Lithium cell only)	5	Lecture , Video & ICT
	Artificial heart valves, Heart – Lung machine – Kidney machine (Block diagram only).	5	Lecture , Video & ICT
UNIT IV			
	Surgical diathermy – Shortwave diathermy – Microwave diathermy – Ultrasonic diathermy	5	Lecture , Video & ICT
	Ventilators (Servo – Controlled with microprocessor based only) – Anaesthesia machine -Vitro oximetry and Vivo oximetry only	5	Lecture , Video & ICT
	Blood cell counter - (laser based blood cell counter only) – Electron Microscope.	5	Lecture , Video & ICT
UNIT V			
	Blood flow meters -Electromagnetic blood flow meter	5	Lecture , Video & ICT
	ultrasonic blood flow meter, Recording fetal heart movements and blood circulation using Doppler ultrasonic method	5	Lecture , Video & ICT
	Gas analysers: (infra red gas analysers, para magnetic oxygen analyser only)	5	Lecture , Video & ICT

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	3	3	4	4	4	3	3	3	4	3.4
CO2	3	4	3	4	3	4	3	3	3	4	3.4
CO3	3	3	4	4	4	4	3	3	3	4	3.5
CO4	3	3	3	4	3	4	3	3	3	4	3.3
CO5	3	3	3	4	3	4	3	3	3	4	3.3
Mean Overall Score											3.38

Result: The Score for this Course is 3.38 (High Relationship)

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Mean Score of COs = Total of Value Total No. of Pos & PSOs	Mean Overall Score of COs = Total of Mean Score Total No. of COs

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	30%	30%
UNDERSTANDING	40%	40%
APPLY	30%	30%

Course Designer: G.Selvarani Department of Physics

Programme : UG Physics **Part III: Elective**
Semester : V **Hours : 5 P/W 75Hrs P/S**
Sub. Code : EP52 **Credits : 5**

TITLE OF THE PAPER: OPTOELECTRONICS AND FIBRE OPTIC COMMUNICATION

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL
	5	2	2	1

PREAMBLE: Studying the nature and properties of optical fibre, fibre materials, photo detectors and optical couplers and applying to the communication systems

COURSE OUTCOME At the end of the Semester, the Students will be able to	Unit	Hrs P/S
UNIT 1 CO1: Recognize and classify the structures of Optical fibre and types	1	15
UNIT 2 CO2: Discuss the fibre materials and optical sources	2	15
UNIT 3 CO3: Analyze various detectors and calculate bit rate	3	15
UNIT 4 CO4: Explain the functioning and types of optical couplers	4	12
UNIT 5 CO5: Integrate several components into communication systems	5	18

SYLLABUS

UNIT I: Optical fibres- Basic structure- Propagation of light wave through it-acceptance angle & acceptance cone - Numerical aperture- Classification of optical fibres- Stepped index fibre- Graded index multimode fibre- Attenuation in optical fibre.

UNIT II: Fibre materials- Glass fibre – Plastic fibre- Light sources of optical fibres-LED- The processes involved in LEDs- Structure of LED- LED materials – Fibre-LED coupling – Semiconductor laser diode.

UNIT-III :

Photo detectors- Characteristics- Photo emissive photo detectors- Photo conductive devices- Photovoltaic devices- p-n junction photo detector- PIN photo diode- Avalanche photodiode- phototransistor- BIT error rate.

UNIT- IV:

Optical couplers - Biconically tappered directional couplers- Beam splitting directional coupler- Splicing of fibre- Steps involved in splicing procedure- Loss comparison.

UNIT –V:

Communication systems- General-transmitter for fibre optic communication- Laser transmitter- Fibre optic receiver- Repeaters- Fibre based modems-Tran receiver- Long haul communication- Special applications: optical fiber system/metallic wire system- Fibre in computer networking – disadvantages of fiber optical systems

TEXT BOOK:

1. Optical fibres and fibre optic communication systems-Dr. Subir kumar sarkar, Revised Fourth edition-2010 – S.Chand& co.

Unit-1 : 2.3-2.5, 3.1, 3.2, 3.5, 3.6,7.1.
Unit-II : 4.7, 4.7.1, 4.7.2 (Ref. Book – 1). 9.1, 9.2, 9.2.1 ,9.2.2, 9.2,3 ,9.2.5. 9.3.3
Unit-III: 10.2-10.10
Unit-IV: 12.2, 12.2.1, 12.2.3, 13.1, 13.4, 13.6
Unit-V : 15.1, 15.2, 15.6, 15.12, 15.15, 15.16, 18.3, 19.10 .

BOOKS FOR REFERENCE:

1. Semiconductor physics and opto electronics-P.K.Palanisamy , SCITECH Publications-4 th reprint, 2004.
2. Optical fibre communication - M.John Senior –PHI-2001 edition.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
	UNIT I		
	Optical fibres- Basic structure	2	Lecture
	Propagation of light wave through it	1	GD
	-acceptance angle & acceptance cone - Numerical aperture-	3	Peer Teaching
	Classification of optical fibres-Stepped index fibre-	3	Peer Teaching
	Graded index multimode fibre-	3	Peer Teaching
	Attenuation in optical fibre.	3	Peer Teaching
	UNIT II		
	Fibre materials- Glass fibre – Plastic fibre	3	Lecture
	Light sources of optical fibres-LED	2	Peer Teaching
	The processes involved in LEDs	2	Peer Teaching
	Structure of LED	2	Lecture
	LED materials	2	GD
	Fibre-LED coupling	2	Peer Teaching
	Semiconductor laser	2	Lecture

	diode.		
UNIT III			
	Photo detectors-Characteristics	2	Lecture
	Photo emissive photo detectors	1	Lecture
	Photo conductive devices	1	Lecture
	Photovoltaic devices-	1	GD
	p-n junction photo detector	2	Peer Teaching
	PIN photo diode	2	Peer Teaching
	Avalanche photodiode	2	Peer Teaching
	Phototransistor	2	Peer Teaching
	BIT error rate	2	Peer Teaching
UNIT IV			
	Optical couplers	1	Lecture
	Biconically tappered directional couplers	3	Peer Teaching
	Beam splitting directional coupler	3	Peer Teaching
	Splicing of fibre	1	Peer Teaching
	Steps involved in splicing procedure	3	Peer Teaching
	Loss comparison	1	Lecture
UNIT V			
	Communication systems	1	Lecture
	General-transmitter for fibre optic communication	1	Peer Teaching
	Laser transmitter	2	Peer Teaching
	Fibre optic receiver	3	Peer Teaching
	Repeaters	2	Peer Teaching
	Fibre based modems-Tran receiver	2	Peer Teaching
	Long haul communication	2	Peer Teaching
	Special applications: optical fiber system/metallic wire system	3	Lecture
	Fibre in computer networking	1	Lecture

	disadvantages of fiber optical systems	1	GD

Course Outcomes (Cos)	Programme Outcomes (Pos)					Programme Specific Outcomes (PSOs)						Mean scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	
CO1	3	3	3	4	4	4	3	3	4	3	3	3.36
CO2	3	4	3	4	4	4	3	3	4	3	3	3.46
CO3	3	4	3	4	4	4	3	3	3	4	3	3.46
CO4	3	3	3	4	4	4	3	3	4	3	3	3.36
CO5	3	4	3	4	4	4	3	3	5	4	4	3.73
Mean Overall Score												3.47

Result: The Score for this Course is 3.47 (High Relationship)

Course Designer: Department of Physics

Programme : B.Sc **Part III: Skill based**
Semester : V **Hours : 2 hrs/W 30 Hrs P/S**
Sub. Code : SP55 **Credit : 2**

TITLE OF THE PAPER: SPECTROSCOPY

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT
	6	2	1	2	1

PREAMBLE: Acquire knowledge and understanding of the basics of spectroscopy and apply it in their higher studies (Post graduate).

COURSE OUTCOME At the end of the Semester, the Students will be able to	Unit	Hrs P/S
UNIT 1 CO1: know the electromagnetic spectrum, their properties and different types of energies of the molecules responsible for the spectrum.	1	6
UNIT 2 CO2: understand the theory of microwave spectrum with the diatomic molecule as rigid rotator. Discuss the validity of theory with selection rule for microwave spectrum.	2	6
UNIT 3 CO3: analyze the theory of Infra red spectroscopy with the vibrating diatomic molecule as harmonic and an harmonic oscillator. explain why it is called as IR spectroscopy.	3	6
UNIT 4 CO4: understand the characteristic properties of Raman lines. explain the theory (both classical and quantum) of Raman effect. Compare IR spectroscopy and Raman spectra. discuss the intensity of Raman peaks.	4	6
UNIT 5 CO5: describe the construction and working of microwave spectrometer, IR spectrophotometer (Single beam) and Raman spectrophotometer (PERKIN ELMER).	5	6

SYLLABUS

UNIT I:

Introduction - Properties of electro magnetic radiation- Electro magnetic spectrum- Different types of molecular energies.

UNIT II:

Introduction to microwave spectroscopy - What is microwave spectroscopy-theory – Diatomic molecule as a rigid rotator -Frequency of rotational spectral lines -Selection rule for rotational spectra- Validity of the theory.

UNIT III:

Introduction to infrared spectroscopy - Range of infrared radiation- Theory of IR absorption spectroscopy – Vibrating diatomic molecule as harmonic oscillator - Vibrating diatomic molecule as anharmonic oscillator.

UNIT IV:

Introduction to Raman spectroscopy - Characteristic properties of Raman Lines- Differences between Raman spectra and infrared spectra – Mechanism of Raman effect – Classical and quantum theory of Raman effect- Pure rotational Raman spectra- Intensity of Raman peaks.

UNIT V:

Instrumentation for microwave spectroscopy (construction and working of microwave spectrometer) - Instrumentation for infrared spectroscopy - Single beam spectro photometer - Instrumentation for Raman spectroscopy (Perkin-Elmer Raman spectrometer).

TEXT BOOKS:

Study Material prepared by the Department.

REFERENCES:

1. Fundamentals of molecular spectroscopy - C.N. Banwell , Seventh reprint, 1988, TMH Publications.
2. Spectroscopy (atomic and molecular) - Gurdeep Chatwal , Sham Anand, First edition – 1983 , Himalaya Pub. House.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT 1: **Electromagnetic radiation and spectrum.**			
1.	Properties of e.m.radiation	2	Lecture, ICT
2.	Electromagnetic spectrum	2	GD, Lecture
3.	Molecular energies	2	Teaching (chalk and talk), Videos
UNIT 11 : **Microwave spectroscopy**			
1.	Introduction (Microwave spectroscopy)	1	Lecture
2.	Diatomic molecule as arigid rotator	2	Teaching (chalk and talk), video
3.	Frequency of rotational spectral lines and selection rule	2	GD, ICT
4.	Validity of the theory	1	Lecture

UNIT III: **Infra red spectroscopy**			
1.	Introduction to IR spectroscopy	1	Lecture
2.	Theory of IR spectroscopy	1	GD
3.	Vibrating diatomic molecule as a harmonic oscillator	2	Teaching (chalk and talk), GD
4.	Vibrating diatomic molecule as an harmonic oscillator	2	Lecture, ICT
UNIT IV : **Raman Spectroscopy**			
1.	Characteristic properties of Raman lines, difference between Raman and IR spectra	2	ICT, GD
2.	Classical and Quantum theory of Raman effect	2	Teaching (chalk and talk), Lecture
3.	Pure rotational spectra and intensity of Raman lines	2	Lecture, Video
UNIT V : **Instrumentation**			
1.	Instrumentation for microwave spectroscopy	2	Lecture, ICT
2.	Infrared Spectroscopy	2	Lecture, Teaching (chalk and talk)
3.	Raman Spectroscopy	2	GD, Videos

Course Outcomes (Cos)	Programme Outcomes (Pos) and Programme Specific Outcomes (PSOs)						Mean scores of Cos					
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	Mean CO
CO1	3	2	3	4	4	3	2	4	3	3	3	3.09
CO2	4	2	3	4	4	4	2	4	3	4	4	3.45
CO3	4	2	3	4	4	4	2	4	3	4	4	3.45
CO4	4	2	3	4	4	4	2	4	3	4	4	3.45
CO5	3	4	3	4	4	3	4	2	2	4	4	3.36
Mean Overall Score of COs												3.36

Result: The Score for this Course is 3.36 (High Relationship)

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%

Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos \& PSOs}}$

Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLICATION	20%	20%

Course Designer: Department of Physics.

Programme : B.Sc | **Part III: Core**
Semester : VI | **Hours : 5 P/W 75 Hrs P/S**
Sub. Code : P61 | **Credits : 5**

TITLE OF THE PAPER: DIGITAL ELECTRONICS

Pedagogy	Hours	Lecture	Peer Teaching	GD/ Vedos/Tutorial	ICT
	5	3	-	1	1

PREAMBLE To understand the fundamental knowledge of digital principles namely the number systems, basic and universal logic circuits, working of multivibrators and flipflops and application of operational amplifier

COURSE OUTCOME At the end of the Semester, the students will be able to	**Unit**	**Hrs P/S**
CO 1: define the different types of number systems and enhance their skills in conversion of number systems	1	15
CO 2: explain the basic and universal logic gates and DeMorgan's law	2	15
CO 3: simplify the logic expressions using Boolean laws and Kmap	3	15
CO 4: understand the working of multivibrators and flipflops	4	15
CO 5: explain the characteristics and application of operational amplifier	5	15

SYLLABUS

UNIT- I: DIGITAL FUNDAMENTALS

Number systems-Binary-Decimal conversion-binary addition- 1's and 2's complement – (subtraction only) double complement -binary multiplication-octal numbers-Decimal to octal-Hexa decimal numbers-Binary coded decimals-Codes-Weighted Binary code-Alpha numeric code-ASCII code.

UNIT- II: LOGIC GATES, BOOLEAN ALGEBRA AND DE MORGAN'S LAWS

Digital circuits-Logic gate-Binary concept-Positive logic and negative logic system-Basic logic gates-AND, OR, NOT gates -Characteristics of logic gate-NOR, NAND, Exclusive OR gate - Boolean algebra-De-Morgan's laws -universal building block.

UNIT- III: KARNAUGH MAP AND BINARY ADDERS

Two variable map-Three variable map-Four Variable map-Minterm-Maxterm-Truth table from Karnaugh map- Don't care conditions- Product -of-sums simplifications - Half adder-Full adder-Encoder-Decimal-to-BCD Encoder-Decoders-BCD-to-decimal decoder.

UNIT- IV: TIMER AND FLIP FLOP

555 Timer-Monostable Multivibrator-Astable multivibrator-Frequency divider-Logic gate flip flop-R-S flip flop-Clocked R-S Flip flop-J-K flip flop-J-K master slave flip flop-D-flip flop-T-Flip flop.

UNIT- V: OPERATIONAL AMPLIFIER

Operational amplifier- Block diagram- Characteristics – slew rate – open loop operation – closed

loop operation – virtual ground – inverting Operational amplifier – summing amplifier – subtracting amplifier –Op amp integrator - Op amp differentiator.

1. ANALOG ELECTRONICS AND DIGITAL ELECTRONICS – G.JOSE ROBIN & A.UBALDRAJ, Indira Publication First Edition: May 2008.
   UNIT: I Chapter 6 : Page No – 286-318
   UNIT: II Chapter 7A & 7B ; Page No : 324-344, 362-375
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   UNIT: III Chapter 7C & 8 : Page No : 389-408 421-425 438-442
   UNIT: IV Chapter 9 : Page No: 454-478
   UNIT: V Chapter 3: Page No: 168-191

REFERENCE BOOKS:

1. Elements of Solid state electronics - A. Ambrose & Vincent Devaraj, Mera Publication, IV Edition,1993

2. Digital Principles and Applications- Albert Paul Malvino & Donald P. Leach Tata Mc Graw Hill Publishing Ltd., sevenh Edition ,2011

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I	Number systems-Binary-Decimal conversion-binary addition- 1's and 2's complement – (subtraction only) double complement -	5	Lecture, ICT&Tutorial
	binary multiplication-octal numbers-Decimal to octal-Hexa decimal numbers-	5	Lecture, ICT&Tutorial
	Binary coded decimals-Codes-Weighted Binary code-Alpha numeric code-ASCII code.	5	Lecture, ICT&Tutorial
UNIT II	Digital circuits-Logic gate-Binary concept-Positive logic and negative logic system-	7	Lecture, ICT&Tutorial
	Basic logic gates-AND, OR, NOT gates -Characteristics of logic gate-NOR, NAND, Exclusive OR gate - Boolean algebra-De-Morgan's laws - universal building block.	8	Lecture, ICT&Tutorial
UNIT III	Two variable map-Three variable map-Four Variable map-Minterm-Maxterm-Truth table from Karnaugh map- Don't care conditions- Product -of-sums simplifications -	5	Lecture, ICT&Tutorial

	Minterm-Maxterm-Truth table from Karnaugh map- Don't care conditions- Product -of-sums simplifications -	5	Lecture, ICT&Tutorial
	Half adder-Full adder- Encoder-Decimal-to-BCD Encoder-Decoders-BCD-to-decimal decoder.	5	Lecture, ICT&Tutorial
UNIT IV	555 Timer-Monostable Multivibrator-Astable multivibrator-Frequency divider-	7	Lecture, ICT&Tutorial
	Logic gate flip flop-R-S flip flop-Clocked R-S Flip flop-J-K flip flop-J-K master slave flip flop-D-flip flop-T-Flip flop.	8	Lecture, ICT&Tutorial
UNIT V	Operational amplifier- Block diagram-Characteristics – slew rate – open loop operation – closed loop operation – virtual ground –	7	Lecture, ICT&Tutorial
	inverting Operational amplifier – summing amplifier – subtracting amplifier –Op amp integrator - Op amp differentiator.	8	Lecture, ICT&Tutorial

Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	4	3	4	3	4	4	3	3	3	4	3.5
CO2	4	3	4	3	4	4	3	3	3	3	3.4
CO3	4	3	3	3	3	4	3	3	3	4	3.3
CO4	4	3	3	3	4	4	3	4	3	4	3.5
CO5	4	4	3	3	4	4	4	4	3	3	3.6
Mean Overall Score											3.46

Result: The Score for this Course is 3.46 (High Relationship)

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Total of Value Mean Score of COs = ---------- Total No. of Pos& PSOs	Total of Mean Score Mean Overall Score of COs =---------- Total No. of COs

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	40%	40%
UNDERSTANDING	40%	40%
APPLY	20%	20%

Course Designer: G.KRISHNA BAMA Department of Physics

Semester :VI **Hours : 5 P/W 75HrsP/S**
Sub. Code : P62 **Credits :5**

TITLE OF THE PAPER: Material Science

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT
	5	2	1	1	1

PREAMBLE:

- To promote an understanding of the basics of crystallography
- To develop an understanding of the unique properties and characteristics of conductivity, superconductivity, magnetic and dielectric based materials.
- To acquaint the student with their types and applications.

COURSE OUTCOME At the end of the Semester, the Students will be able to	Unit	Hrs P/S
UNIT 1 CO1: • Conceptually explain the classification schemes that are used to categorize engineering materials and describe how and why defects in materials greatly affect engineering properties and limit their use in service	1	16
UNIT 2 CO2: • understand concisely and effectively resistivity and conductivity using basic relations, gain important conceptual and operational understanding of different types of conduction materials	2	16
UNIT 3 CO3: • Complete understanding about superconductors, their basic theories, types and applications.	3	16
UNIT 4 CO4: • Explain the differences in the behavior of magnetic materials based upon composition and processing and their applications	4	16
UNIT 5 CO5: • To acquaint complete knowledge of dielectric materials, with their types and applications.	5	11

SYLLABUS

UNIT I: ELEMENTARY CRYSTALLOGRAPHY

Material Science – Different types of chemical bonds (Ionic, Covalent, Metallic, Dispersion and dipole) – Crystal structure (sc, bcc, fcc) – Crystal imperfections – Point defects – Line defects – Surface defects – Volume defects – Effects of crystal imperfections.

UNIT II: CONDUCTING MATERIALS

Introduction – Atomic interpretation of ohm's law – Relaxation time & electrical conductivity –

Derivation of electrical conductivity of a metal – Electrical and thermal conductivity – The heat developed in a current caring conductor – Different types of conduction materials: Low resistivity conducting materials (properties, examples) – High resistivity conducting materials (properties examples)

UNIT-III : SUPER CONDUCTING MATERIALS

Introduction – Explanation of the occurrence of Super conductivity (BCS and RVB theory) – general properties of super conductors – Types of super conductors (Type I & Type II) Applications of superconductor.

UNIT-IV : MAGNETIC MATERIALS

Introduction – Different types of magnetic materials – Hysteresis – Explanation of Hysteresis cure on the basis of domain theory- Hard and soft materials – Applications of Soft magnetic materials- Iron-Silicon (Fe-Si)alloy, Iron-Nickel (Fe-Ni)alloy – ferrites & Garnets – Application of Ferites : Gyrator, Isolator – Garnets.

UNIT – V : DIELECTRIC MATERIALS

Dielectrics – Fundamental definitions in dielectrics – Various polarization mechanisms in dielectrics – Internal field (Clausius – Mosotti relation) Dielectric breakdown – Applications of dielectric materials.

TEXT BOOKS: Dr. M. Arumugam, Anuradha Publications Reprint 2010.

REFERENCES:

1. Material Science : P.K. Palanisamy, I Print,2004,Scitech Publications (India) PvtLtd.,Chennai – 6000 017.
2. V. Rajendran, A. marikani II print, 2004. Tata McGraw Hill Publishing com. Ltd., New Delhi

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT 1			
	Material Science – introduction	2	Peer teaching
	Different types of chemical bonds	1	Tutorials
	Ionic bond	1	Lecture
	Covalent bond	1	Lecture
	Metallic, Dispersion and dipole	1	Lecture
	Crystal structure - sc, bcc, fcc	1	Peer teaching
	sc, bcc, fcc	1	Lecture
	Crystal imperfections – Point defects	1	Lecture
	Line defects – Surface defects	1	Lecture
	Volume defects	1	Lecture
	Effects of crystal imperfections.	3	ICT
	Revision	2	Tutorials
UNIT 11			
	Introduction toconducting materials	2	Peer Teaching
	Atomic interpretation of ohm's law	1	Lecturer
	Relaxation time & electrical	2	Lecturer

	conductivity		
	Derivation of electrical conductivity of a metal	2	Lecturer
	Electrical and thermal conductivity	2	Peer Teaching
	The heat developed in a current caring conductor	1	Lecture
	Different types of conduction materials: Low resistivity conducting materials (properties, examples) – High resistivity conducting materials (properties examples)	3	ICT
	Revision	3	Tutorial
UNIT III			
	Introductionto super conducting materials	3	ICT
	Explanation of the occurrence of Super conductivity	2	Peer Teaching
	BCS theory	1	Lecture
	RVB theory	1	Lecture
	general properties of super conductors	2	Peer Teaching
	Types of super conductors (Type I & Type II)	2	Lecture
	Applications of superconductor.	2	Peer Teaching
	Revision	3	Tutorial
UNIT IV			
	Introductionto magnetic materials	2	Peer Teaching
	Different types of magnetic materials	2	ICT
	Hysteresis	2	Peer Teaching
	Explanation of Hysteresis cure on the basis of domain theory	1	Lecture
	Hard and soft materials	1	ICT
	Applications of Soft magnetic materials- Iron-Silicon (Fe-Si)alloy, Iron-Nickel (Fe-Ni)alloy	2	Lecture
	ferrites & Garnets – Application of Ferites : Gyrator, Isolator	2	Lecture
	Garnets.	1	Lecture
	Revision	3	Tutorial
UNIT V			
	Introduction to dielectric materials	1	Peer teaching
	Fundamental definitions in dielectrics	2	ICT
	Various polarization mechanisms in dielectrics	3	Lecture
	Internal field (Clausius – Mosotti relation)	1	Lecture
	Dielectric breakdown	1	Lecture
	Applications of dielectric materials.	1	Peer teaching

	Revision	2	Tutorial

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	4	3	4	3	3	4	3	3	5	3.5
CO2	5	3	4	3	4	3	3	4	3	4	3.6
CO3	3	3	3	4	3	3	5	4	3	3	3.4
CO4	3	3	4	3	3	3	4	4	3	4	3.4
CO5	4	3	3	4	4	3	3	4	4	3	3.5
Mean Overall score											3.48

Result: The Score for this Course is 3.48 (High Relationship)

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos\& PSOs}}$

Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%

Course Designer: Department of Physics

Programme : B.Sc. **Part III: Core**
Semester : VI **Hours :5 P/W 75 HrP/S**
Sub. Code : P63 **Credits : 5**

TITLE OF THE PAPER: CLASSICAL,STATISTICAL,QUANTUM MECHANICS AND RELATIVITY

Pedagogy	**Hours**	**Lecture**	**Peer Teaching**	**GD/ Vedos/Tutorial**	**ICT**
	5	3	-	1	1

PREAMBLE: This course is essential to formulate and solve classical mechanics problems using Lagrangian and Hamiltonian methods. To learn statistical interpretation of thermodynamics and the concept of special theory of relativity.

COURSE OUTCOME At the end of the Semester, the Students will be able to	**Unit**	**Hrs P/S**
UNIT 1 CO1: Define the basic concepts in classical mechanics.	1	15
UNIT 2 CO2: differentiate classical and statistical quantum mechanics.	2	15
UNIT 3 CO3: apply both classical and quantum approach to some of the physical systems.	3	15
UNIT 4 CO4: explain the basics of relativity.	4	
UNIT 5 CO5: describe the laws of statistical mechanics.	5	15

SYLLABUS

UNIT – I: CLASSICIAL MECHANICS

Mechanics of a particle(conservative forces only) – Conservation of energy for a system of particles – Basic concepts – Degrees of freedom – Constraints - Generalised notations – Lagrangian formulation of mechanics – Derivation of Lagrange's equation of motion (from D' Alemberts principle only) – The Hamiltonian function H – Hamilton's canonical equations of motion.

UNIT – II : WAVE MECHANICS – I

Matter waves – The de Broglie wavelength – Expression for de Broglie length – Other expressions for de Broglie wavelength – Phase velocity of de Broglie waves – Group velocity – Expression for group velocity – Heisenbergs uncertainty principle – Illustrations – Energy-Time uncertainty relation – Derivation of time dependant and steady state forms of Schrodinger equation – Eigen values and Eigen functions.

UNIT – III :APPLICATIONS OF EQUATIONS

Applications of Lagrange's equation – The Atwood's Machine – Simple pendulum – Compound pendulum – Linear harmonic oscillator – Applications of Hamilton's equations of motion – Linear harmonic oscillator – Simple pendulum – Compound pendulum – Properties of the wave function – Physical significance of wave function – Applications of Schrodinger's equation – The free particle – The particle in a box.

UNIT – IV : RELATIVITY

Michelson - Morley Experiment – Postulates of special theory of relativity – Lorentz transformation

equation – Length contraction – Time dilation – Relativity of simultaneity – Addition of velocities – Variation of with velocity – Mass energy equivalence – Relationship between the total energy, the rest energy and the momentum.

UNIT - V: STATISTICAL MECHANICS

Phase space(definitions only) – Ensembles – Types of ensembles (definition only) – Basic concepts – Microscopic and macroscopic descriptions – Probability – Thermodynamic probability – Boltzmann's theory of Entropy and probability – Fundamental of Statistical Mechanics – Statistical equilibrium – Maxwell - Boltzmann distribution law – Bose - Einstein's statistics – Fermi - Dirac statistics – Comparison of the three distribution laws.

TEXT BOOKS:

Modern Physics - R. Murugeshan, KiruthigaSivaprasath, S.Chand& Co. Pvt. Ltd., 2016, 18th Edition.

BOOKS FOR REFERENCE:

1. Principles of Modern Physics – Robert – B.Leighton, MC-Graw Hill Book Company VI Edition.
2. Introduction of Modern Physics – F.K.Rchtmyer, E.H.KennerJohn.N.Cooper, IV Edition, Mc-Graw Hill Book Company
3. Concepts of Modern physics – Arthur Beiser Mc-Graw Hill Book Company, Reprint 2002.
4. Atomic Physics – J.B.Rajam, S.Chand& Co.,

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I	Mechanics of a particle(conservative forces only) – Conservation of energy for a system of particles.	5	Lecture, G.D & ICT
	Basic concepts – Degrees of freedom – Constraints - Generalised notations – Lagrangian formulation of mechanics.	5	Lecture,G.D & ICT
	Derivation of Lagrange's equation of motion (from D' Alemberts principle only) – The Hamiltonian function H – Hamilton's canonical equations of motion.	5	Lecture & ICT
UNIT II	Matter waves – The de Broglie wavelength – Expression for de Broglie length – Other expressions for de Broglie wavelength	4	Lecture,G.D & ICT
	Phase velocity of de Broglie waves – Group velocity – Expression for group velocity – Heisenbergs	5	Lecture,G.D & ICT

	uncertainty principle – Illustrations – Energy-Time uncertainty relation.		
	Derivation of time dependant and steady state forms of Schrodinger equation – Eigen values and Eigen functions.	5	Lecture,G.D & ICT
	Problem discussion	1	Group discussion
UNIT III	Applications of Lagrange's equation – The Atwood's Machine – Simple pendulum – Compound pendulum.	5	Lecture,G.D & ICT
	Linear harmonic oscillator – Applications of Hamilton's equations of motion – Linear harmonic oscillator – Simple pendulum – Compound pendulum .	5	Lecture, G.D & ICT
	Properties of the wave function – Physical significance of wave function – Applications of Schrodinger's equation – The free particle – The particle in a box.	5	Lecture,G.D & ICT
UNIT IV	Michelson - Morley Experiment – Postulates of special theory of relativity – Lorentz transformation equation	5	Lecture, G.D & ICT
	Length contraction – Time dilation – Relativity of simultaneity – Addition of velocities.	4	Lecture, G.D & ICT
	Variation of with velocity – Mass energy equivalence – Relationship between the total energy, the rest energy and the momentum.	5	Lecture, G.D & ICT
	Problem discussion	1	Group discussion
UNIT V	Phase space(definitions only) – Ensembles – Types of ensembles (definition only) – Basic concepts – Microscopic and macroscopic descriptions.	5	Lecture, G.D & ICT
	Probability – Thermodynamic probability – Boltzmann's theory of Entropy and probability – Fundamental of Statistical Mechanics – Statistical equilibrium – Maxwell - Boltzmann distribution law	5	Lecture, G.D & ICT
	Bose - Einstein's statistics – Fermi - Dirac statistics – Comparison of the three distribution laws.	5	Lecture, G.D & ICT

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	4	3	4	3	3	4	3	3	5	3.5
CO2	5	3	4	3	4	3	3	4	3	4	3.6
CO3	3	3	3	4	3	3	5	4	3	3	3.4
CO4	3	3	4	3	3	3	4	4	3	4	3.4
CO5	4	3	3	4	4	3	3	4	4	3	3.5
Mean Overall score											3.48

Result: The Score for this Course is 3.48 (High Relationship)

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Mean Score of COs = Total of Value / Total No. of Pos& PSOs	Mean Overall Score of COs = Total of Mean Score / Total No. of COs

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	30%	30%
UNDERSTANDING	30%	30%
APPLY	40%	40%

Course Designer: R. Vijayalakshmi Department of Physics

Programme :B.Sc PHYSICS | **PART III : ELECTIVE**
Semester : VI | **Hours : 5 P/W, 75Hrs P/S**
Sub code : EP63 | **Credits : 5**

TITLE OF THE PAPER : NUCLEAR PHYSICS

Pedagogy	Hours	Lecture	Peer teaching	TUTORIAL	ICT
	5	2	1	1	1

PREAMBLE :
The purpose of this course is to give an introductory details about the basic principles of nuclear physics. It presents a detailed introduction to its fundamental principles and applications. It gives brief information about structure of nucleus , radiation detectors, particle accelerators , radioactivity, nuclear energy, cosmic rays and elementary particles.

COURSE OUTCOME At the end of the Semester, the students will be able to	UNIT	Hrs P/S
UNIT 1 CO1- NUCLEAR ASPECTS NUCLEAR MODELS **PROGRAMME OUTCOME :** **PART – A** 1. acquire knowledge about schematic representation of any nuclide.(K) 2. list the types of nuclei.(K) 3. define binding energy.(K) 4. define packing fraction.(K) 5. understand about magic numbers.(U) 6. determine nuclear mass and mass defect.(P) 7. analyse electric quadrapole moment.(A) 8. interpret semi-empirical formula.(S) 9. draw and explain stability curve of nuclei.(C) 10. explain parity of nuclei.(E) **PART – B** 1. acquire knowledge about characteristics of nuclear forces.(K) 2. understand binding energy of nuclei.(U) 3. analyse stability of nuclei.(A) 4. calculate nuclear density.(P) 5. compare liquid drop model and shell model.(S) 6. design shell model of any nucleus.(C) 7. explain meson theory of nuclear forces.(E) **PART – C** 1. get knowledge about general properties of nucleus.(K) 2. understand packing fraction.(U) 3. calculate radius, binding energy, packing fraction and stability of nucleus.(P) 4. determine disintegration energy of mirror nuclei.(P) 5. analyse theories of nuclear composition.(A) 6. predict the properties of various nuclei and can explain	1	15

why stable nuclei never have more protons.(S)
7. construct nuclear structure of any nuclei.(C)
8. explain liquid drop model of nuclei using semi-empirical mass formula.(E)
9. explain sailent features of shell model.(E)

PROGRAMME SPECIFIC OUTCOME :

PART – A

1. know the relation between nuclear radius and mass number.[K(I)]
2. compare the various classes of nuclei.[E(I)]
3. calculate the binding energy of the given nuclei.[P(I)]
4. assess the packing fraction of various elements.[P(R)]
5. analyse the relation between binding energy and nuclear stability.[A(I)]
6. understand what is isospin quantum number.[U(I)]
7. predict the relation between stability and number of atomic number and neutron number.[S(I)]
8. understand relation between shape and electric quadrapole moment.[U(I)]
9. draw packing fraction curve of nuclei.[C(I)]
10. know the binding forces between nucleons are due to exchange of mesons.[K(I)]
11. decide whether the nuclei is having odd parity or even parity.[S(I)]

PART – B

1. discuss the general properties of nuclei.[U(I)]
2. analyse the binding energy graph.[A(R)]
3. assess the stability of nuclei and to determine the stable and unstable elements.[E(R)]
4. explain the reasons for the absence of electrons inside the nucleus.[K(M)]
5. compare the similarities between liquid drop and nuclear structure.[K(R)]
6. calculate nuclear radius, nuclear density, nuclear charge and nuclear magnetic moments of various nucleus.[P(R)]
7. know the concept of protron-neutron hypothesis.[K(R)]
8. design shell model of any nuclei.[C(M)]
9. obtain an expression for energy released in symmetric fission.[S(M)]

PART – C

1. describe Yukawa's meson theory of nuclear forces and to estimate the approximate meson mass . [P(M)]
2. analyse the liquid drop model with suitable Weizacker semi-empirical mass formula.[A(M)]
3. explain how the shell model can be used to predict the angular momenta and magnetic momenta of odd A- nuclei

in the ground state.[E(M)] 4. analyse the theories of nuclear composition[A(R)] 5. obtain an expression for energy released in symmetric fission.[C(R)] 6. predict stability of nuclei against beta decay and mass parabolas of odd isobars[S(I)] 7. derive an expression for alpha decay and to obtain an expression for beta disintegration energy of mirror nuclei.[C(I)]		
UNIT 2 CO2 **UNIT - II : RADIOACTIVITY** **PROGRAMME OUTCOME :** **PART – A** 1. define range of alpha particle.(K) 2. know what is Geiger –Nuttal law.(K) 3. define curie and Rutherford.(K) 4. understand the range of alpha particle.(U) 5. understand end point energy.(U) 6. calculate disintegration energy of alpha particle.(P) 7. analyse the relation between range and energy of particle.(A) 8. synthesize range versus ionisation potential graph.(S) 9. draw range versus disintegration graph of radioactive nuclei and can explain.(C) 10. evaluate the activity of nuclei.(E) PART – B 1. know about radioactive dating.(K) 2. understand the origin of continuous spectra.(U) 3. determine the energy of beta particle.(P) 4. analyse Geiger-Nuttal law.(A) 5. differentiate sharp line spectra and continuous spectra.(U) 6. illustrate alpha particle spectra.(P) 7. explain neutrino theory of beta decay.(E) PART – C 1. know about properties of alpha, beta and gamma rays.(K) 2. understand radio carbon dating.(U) 3. demonstrate the experimental set up and its working for the determination of range of alpha particle.(P) 4. analyse the age of earth.(A) 5. justify the fact that electrons are emitted from nuclei in beta decay.(S) 6. predict the age of any specimen.(C) **7.** explain beta ray spectrum.(E) **PROGRAMME SPECIFIC OUTCOME :** **PART - A** 1. define range of alpha particle.[K(R)] 2. evaluate alpha particle disintegration energy.[E(R)]	2	15

3. calculate the energy of beta particle.[P(M)] 4. identify Geiger-Nuttalrelation.C(I) 5. analyse the particles emitted in beta decay.[A(R)] 6. know the relation between range and internal energy of alpha particle.[K(R)] 7. understand the factors affecting range of alpha particle.[U(M)] 8. assess the relation between range and velocity of particle.[E(I)] 9. list five groups of alpha particle.[K(I)] 10. predict the charge carried by alpha particle.[C(I)] 11. know the relation between number of atoms and disintegration constant.[K(I)] 12. analyse the relation between disintegration constant and half-life period.[A(I)] **PART – B** 1. describe how the range can be measured experimentally.[U(R)] 2. demonstrate the experimental arrangement for the determination of the energy of beta particle and determine the energy of beta particle.[P(I] 3. analyse Gamow's theory of alpha decay and to explain how it leads to Geiger-Nuttal law.[A(M)] 4. calculate the age of earth and various specimen.[S(R)] 5. design a graph between decay constant and half –life period.[C(R)] 6. know about the concept of radio carbon dating.[K(R)] 7. explain the law of radio active disintegration.[E(R)] **PART – C** 1. compare alpha particle spectra and beta particle spectra. [E(I)] 2. describe radioactive dating.[U(I)] 3. explain the neutrino theory of beta decay.[E(R)] 4. discuss the origin of continuous spectrum.[K(I)] 5. calculate decay constant ,half life period, activity of a given specimen.[S(R)] 6. explain beta ray spectrum.[E(M)] 7. explain half life period of a radioactive element and derive an expression for it.[E(R)] 8. list the properties of alpha, beta and gamma rays.[K(R)] 9. design graph between range and ionisation potential and can explain the graph.[C(M)]		
UNIT 3 CO3- ARTIFICIAL TRANSMUTATION OF ELEMENTS ANDDETECTORS **PROGRAMME OUTCOME :** **PART – A** 1. define threshold energy.(K)	3	15

2. define specific ionisation.(K) 3. know what is endoergic reaction.(K) 4. know the principle of ionization chamber.(K) 5. understand recovery time.(U) 6. understand resolving time.(U) 7. compute Q-value of nuclear reaction.(P) 8. analyse the efficiency of counter.(A) 9. determine recovery time.(S) 10. calculate radial field of proportional counter.(C) 11. explain Bohr's theory of nuclear disintegration.(E) **PART – B** 1. know the energy balance in nuclear reaction and Q-value of reaction.(K) 2. understand conservation laws.(U) 3. understand construction and working of proportional counter.(U) 4. calculate threshold energy of nuclear reaction. (P) 5. analyse threshold energy of endoergic reaction.(A) 6. calculate resolving time of GM counter.(S) 7. design time versus counter voltage graph of Geigher counter.(C) 8. explain the construction and working of bubble chamber.(E) **PART – C** 1. know the construction and working of ionisation chamber.(K) 2. understand quenching in GM counter.(U) 3. calculate current produced within ionisation chamber and number of ion pairs required and energy of alpha particles.(P) 4. analyse types of reactions.(A) 5. describe the discovery of artificial transmutation.(P) 6. develop the skills to determine best detector.(C) 7. explain Q-value of nuclear reaction.(E) **PROGRAMME SPECIFIC OUTCOME :** **PART – A** 1. discuss Q- value of nuclear reaction.[U(I)] 2. define threshold energy.[K(M)] 3. analyse the conservation laws followed in a given nuclear reaction.[A(M)] 4. determine the threshold energy of neutrons.[S(I)] 5. assess whether the given relation is exothermic or endothermic.[E(M)] 6. define specific ionisation.[K(I)] 7. define multiplication factor.[K(I)] 8. understand the relation between recovery time and pulse		

size.[U(I)] 9. know that the number of ion pairs predicts energy of particle.[K(R)] 10. determine product nuclei and Q –value in reaction. [P(R)] **PART – B** 1. know Bohr's theory of nuclear disintegration.[K(I) 2. Derive an expression for threshold energy of an endoergic reaction.[S(I)] 3. calculate the Q-value of given nuclear reaction.[P(M)] 4. assess the types of given nuclear reactions.[E(M)] 5. describe the construction and working of proportional counter.[U(M)] 6. explain quenching in GM counter.[E(M)] 7. analyse resolving time of a GM counter.[A(M)] 8. compare advantages of detectors.[E{R)] **PART – C** 1. describe the construction and working of GM counter.[U(M)] 2. demonstrate ionisation chamber and calculate the current produced in ionisation chamber when a particle with the energy passes through it.[P(R)] 3. compare the working of detectors and design the best detector.[C(M)] 4. explain Q-value of nuclear reaction.[E(M)] 5. analyse the construction and working of proportional counter.[A(M)] 6. compare the working of detectors and can predict best detector[E(M)] 7. know the working of bubble chamber.[K(M)] 8. explain construction and working of ionisation chamber.[E(M)]		
UNIT 4 CO4-PARTICLE ACCELERATORS NEUTRON AND NUCLEARFISSION **PROGRAMME OUTCOME :** **PART – A** 1. know the principle behind particle accelerator.(K) 2. define nuclear fission.(K) 3. define critical size of a system.(K) 4. define chain reaction. (K) 5. list the five elements in nuclear reaction.(K) 6. understand controlled chain reaction.(U) 7. understand the limitations of linear accelerators.(U) 8. calculate cyclotron resonance condition.(P) 9. analyse multiplication factor .(A) 10. synthesize resonance frequency of synchrocyclotron.(S)	4	15

11. determine the time period of reversal in dee's of cyclotron.(C) 12. explain the advantages of synchrocyclotron over cyclotron.(E) **PART – B** 1. know about the concept of nuclear fission.(K) 2. differentiate neutrons.(U) 3. determine critical size of a system.(P) 4. analyse critical size of a system.(A) 5. synthesize energy released in fission.(S) 6. predict the uses of neutrons in various fields.(C) 7. explain neutron sources and neutron detectors.(E) **PART – C** 1. know about the concept of chain reaction.(K) 2. understand the construction and working of cyclotron.(U) 3. calculate the average energy gained per revolution and final energy of electron.(P) 4. analyse the working of atom bombs.(A) 5. describe the construction and working of linear accelerator.(S) 6. compare the advantages and disadvantages of accelerator and predict the best one.(C) 7. explain the construction and working of nuclear reactor. (E) **PROGRAMME SPECIFIC OUTCOME :** **PART – A** 1. calculate the time period of reversal of electric field In dee's of cyclotron.[S(R)] 2. conclude the type of particle that can be accelerated by betatron.[C(R)] 3. decide whether a cyclotron be used to accelerate electrons.[S(I)] 4. discuss what are slow neutrons.[U(R)] 5. know the accelerator that works on the principle of synchro acceleration.[K(I)] 6. differentiate fast and slow neutrons.[U(I)] 7. explain the principle used in cyclotron.[E(I)] 8. understand the use of particle accelerator.[U(I)] 9. know the type of particle that can be accelerated by betatron.[K(I)] **PART – B** 1. determine the flux density of the magnetic field and velocity of deuterons emerging out cyclotron.[S(M)] 2. compare the advantages of particle accelerator.[E(I)] 3. demonstrate the construction and working of		

synchrocyclotron.[S(M)] 4. analyse the applications of nuclear fission.[A(I)] 5. discuss about neutron sources.[U(I)] 6. know about neutron detectors.[K(I)] 7. explain uses of neutron.[E(R)] 8. explain nuclear fission and the energy released in nuclear fission.[E(R)] 9. illustrate the working of atom bomb.[P(R)] **PART -C** 1. Determine the frequency of radio frequency voltage and length of the tube entered by the proton in linear accelerator.[P(I)] 2. describe the principle, construction and working of nuclear reactor.[U(R)] 3. analyse the working of accelerators and explain which type of accelerator can be mostly used for particle acceleration.[A(I)] 4. describe the construction and working of cyclotron and to determine how rapidly the electric field between the dee's will be reversed[S(M)] 5. know about the construction and working of betatron.[K(M)] 6. understand the construction and working of synchrocyclotron.[U(M)] 7. explain about chain reaction, multiplication factor and critical size.[E(M)] 1. [U(M)] 2. decide what are particles and antiparticles in the given elementary particles.[C(M)] 3. determine the energy released by the given elementary particle.[S(M)] 4. list the group of particles belongs to lepton.[(K(I)] 5. analyse the particle of strong interaction.[A(I)] 6. explain why hyperons are called strange particles.[E(I)] 7. know about heavy particles.[K(I)] 8. know what are cosmic rays.[K(I)]		
UNIT 5 CO5- COSMIC RAYS AND ELEMENTARY PARTICLES **PROGRAMME OUTCOME :** **PART – A** 1. know what is cosmic ray.(K) 2. understand what is east-west effect.(U) 3. determine minimum momentum at zenith.(P) 4. analyse longitudinal effect.(A) 5. predict east-west asymmetry in cosmic rays.(S) 6. differentiate various mesons.(U)	5	15

7. explain particles and antiparticles.(E)

PART – B

1. know about cascade theory of cosmic rays.(K)
2. understand the working of Vanallen belts.(U)
3. illustrate use of neutron in the discovery of positron.(P)
4. analyse altitude effect.(A)
5. describe pair production and pair annihilation and can derive the energy content of radiation in pair production.(S)
6. give the reason for season and dinural changes.(C)
7. explain latitude effect.(E)

PART – C

1. know about baryons, leptons, meson and hyperons.(K)
2. understand the origin of cosmic rays.(U)
3. give evidence of the fact that cosmic rays are composed more number of positive charged particles.(S)
4. analyse primary and secondary cosmic rays.(A)
5. illustrate the effect of earth's magnetic field on cosmic rays.(P)
6. draw the graph between latitude versus cosmic ray intensity and altitude versus cosmic ray intensity.(C)
7. explain cosmic ray showers.(E)
8. explain elementary particles.(E)

PROGRAMME SPECIFIC OUTCOME :

PART - A

1. differentiate latitude, altitude and azimuthal.[U(M)]
2. decide what are particles and antiparticles in the given elementary particles.[C(M)]
3. determine the energy released by the given elementary particle.[S(M)]
4. list the group of particles belongs to lepton.[(K(I)]
5. analyse the particle of strong interaction.[A(I)]
6. explain why hyperons are called strange particles.[E(I)]
7. know about heavy particles.[K(I)]
8. know what are cosmic rays.[K(I)]

PART – B

1. demonstrate the designing and working of Van Allen Belt[C(I)]
2. discuss origin of cosmic rays.[U(I)]
3. design a picture to represent primary cosmic rays and secondary cosmic rays.[C(M)]
4. differentiate latitude and altitude effect.[U(R)]
5. analyse azimuthal and east-west effect.[A(R)]
6. know about particles and antiparticls.[K(I)]

7. explain the discovery of positron and about mesons.[E(I)] 8. explain the effect of earth's magnetic field on cosmic rays.[E(R)] 9. illustrate the applications of cosmic rays.[P(I)] **PART - C** 1. analyse the latitude ,longitude and azimuthal effect.[A(R)] 2. illustrate the applications of elementary particles in various fields.[P(I)] 3. give an account on cosmic ray showers.[K(M)] 4. discuss about the classification of elementary particles.[K(R)] 5. explain primary , secondary cosmic rays and cascade theory of cosmic rays.[E(R)]		

SYLLABUS **SEMESTER VI**

ELECTIVE PAPER III

NUCLEAR PHYSICS **5 Hrs/week**

Code : EP63 **Credit : 5**

UNIT- I: NUCLEAR ASPECTS AND NUCLEAR MODELS

Introduction – Classification of nuclei – General properties- Binding energy – Nuclear Stability- Theories of nuclear Composition-Nuclear forces-Meson theory of nuclear forces- Models of nuclear structure – Liquid drop model- Applications of semi empirical mass formula- Shell model.

UNIT- II: RADIOACTIVITY

Range of alpha particles – Experimental measurement of the range of alpha particles - Alpha particle disintegration energy- Alpha particle spectra- Beta rays spectrum – Origin of the continuous spectrum- Neutrino theory of beta decay – Units of radioactivity- Radioactive dating – Age of earth.

UNIT- III: ARTIFICIAL TRANSMUTATION OF ELEMENTS AND DETECTORS

Bohrs theory of nuclear disintegration- Q value equation for a nuclear reaction– Types of nuclear reaction- Conservation laws- Energy balance in nuclear reactions and the Q value - Ionisation chambers- Proportional counter- G-M counter- Bubble chamber

UNIT- IV: PARTICLE ACCELERATORS, NEUTRON AND NUCLEAR FISSION

Linear accelerator - Cyclotron- Synchrocyclotron- Betatron-Classification of neutron –neutron sources-neutron detection- nuclear fission-Energy released in fission-Chain reaction-atom bomb-nuclear reactors.

UNIT- V: COSMIC RAYS AND ELEMENTARY PARTICLES

Cosmic rays- Latitude effect – Azimuthal effect - Altitude effect- Primary cosmic rays - Secondary cosmic rays- Cosmic ray showers- Van allen belt- Origin of cosmic rays – Elementary particles- Introduction - Particles and anti particles.

TEXT BOOK:

1.Modern Physics – R. Murugeshan – eighteenth Revised Edition 2016 – S.Chand

UNIT-I -(17.1-17.7),17.7.1,17.10,17.11,17.12
UNIT—II – 20.4,(20.4.1),20.5,20.6,20.10,(20.10.1),(20.10.2),20.19,20.21
UNIT—III – 21.1,21.2,(21.2.1),(21.2.3),(21.2.4),18.3,18.5,18.6,18.8
UNIT—IV -19.2,19.3,19.4,19.5,(21.10.1),21.11,21.12,22.1,(22.1.1),22.2,(22.2.1)22.3
UNIT—V – 23.1,23.2,23.3,23.4,23.5,23.6,23.9,23.10,24.1,24.2

BOOKS FOR REFERENCE:

1. Atomic Physics — Satyaprakash – Latest revised Edition after 2000 Published by RatanPrakashan, Mandir.
2. Nuclear Physics and Particle Physics — Satyaprakash- 2005 Edition – Sultan Chand & Sons.
3. Concept of Modern Physics — Arthur Beiser- II Edition, McGrawHillKogakusha Ltd.
4. Modern Physics — Richtmyer, Kennard & Cooper -VI Edition, McGraw Hill Book Company.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT - I	Introduction, classification of nuclei, general properties of nucleus	3	L,P,I
	Binding energy, nuclear stability	3	L,P,T
	Theories of nuclear composition, nuclear forces	3	L,P,I
	Meson theory of nuclear forces	2	L,T
	Models of nuclear structure-liquid drop model	2	L,T
	Applications of semi empirical mass formula, shell model	2	L,I
UNIT-II	Range of alpha particles, experimental measurement of range	3	L,T,P
	Alpha particle disintegration energy, alpha particle spectra	3	L,P,I
	Beta ray spectrum	3	L,T,I
	Origin of continuous spectrum	2	L,I
	Neutrino theory of beta decay	2	L,T
	Units of radioactivity, radioactive dating, age of earth	2	L,P

UNIT-III	Bohrs theory of nuclear disintegration,Q-value	2	L,T
	Types of nuclear reaction,conservation laws, energy balance	3	L,P,I
	Ionisation chamber	2	L,I
	Proportional counter	3	L,T,P
	G-M counter	3	L,P,T
	Bubble chamber	2	L,I
UNIT-IV	Linear accelerator,cyclotron	3	L,T,P
	Synchrotron, betatron	2	L,I
	Classification of neutron, neutron sources, neutron detectors	3	L,T,P
	Nuclear fission, energy released in nuclear fission	2	L,I
	Chain reaction, atom bomb	3	L,T,P
	Nuclear reactor	2	L,I
UNIT-V	Cosmic rays, latitude effect	3	L,T,I
	Azimuthal effect , altitude effect	3	L,P,I
	Primary cosmic rays, secondary cosmic rays	2	L,T
	Vanallen belt, origin of cosmic rays	2	L,P
	Elementary particles, particle and antiparticle	3	L,P,I
	Cosmic ray shower	2	L,T

Cource outcomes (COs)	**Programme Outcomes (POs)**							**Programme Specific Outcomes (PSOs)**							**Mean scores of Cos**
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	
CO1	6	3	3	3	3	3	4	5	3	4	4	4	4	3	3.71
CO2	5	5	3	3	3	2	2	3	6	3	3	2	3	5	3.43
CO3	6	5	4	3	2	3	3	5	4	3	3	2	1	7	3.64
CO4	7	4	3	3	3	3	3	4	6	2	2	4	1	4	3.5
CO5	3	4	3	3	3	2	4	6	3	2	3	1	3	4	3.14
	Mean overall score														3.48

Result : The Score for this course is 3.48 - High

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%

Course Designer : J.S.P.CHITRA , Department of PHYSICS

SEMESTER V & VI
CORE PAPER XI
MAJOR PRACTICAL PAPER – III

CODE : PP3 **3 hrs / week**

Any 16/ 22 experiments are to be done. **Credit : 3**

NON ELECTRONICS

1) Newton's rings
2) Hartmann's interpolation formula
3) Spectrometer – i-d curve
4) Spectrometer – i-i' curve
5) Spectrometer – Cauchy's constants
6) Spectrometer – D.P. & R.P. of grating
7) BG – Determination of mutual inductance
8) BG – Determination of absolute capacity
9) BG – Ammeter Calibration
10) BG – High resistance by leakage
11) Conversion of galvanometer into ammeter & voltmeter
12) Emf of Thermocouple by potentiometer
13) Maxwell's bridge – Determination of L
14) Anderson's bridge – Determination of L
15) Koenig's method – Determination of young's modulus (Non uniform)
16) Solar cell characteristics
17) Photo voltaic cell characteristics
18) Fiber optics – Numerical Aperture & Acceptance angle
19) Fiber optics – Attenuation Losses
20) Potentiometer-Resistance & Resistivity.
21) Laser Diffraction – Determination of Wavelength
22) Laser Diffraction – Determination of Slit width

SEMESTER V & VI
CORE PAPER XI
MAJOR PRACTICAL PAPER – IV

CODE : PP4 **2 hrs / week**

Any 16/ 22 experiments are to be done. **Credit : 2**

ELECTRONICS

1. Construction of Bridge rectifier & voltage doubler
2. Zerner diode characteristics and voltage regulation
3. Hartley Oscillator – Transistor
4. Colpitt's Oscillator – Transistor
5. Single state amplifier with and without feed back– Transistor
6. Double Stage amplifier – Transistor
7. Astable multivibrator – Transistor
8. Characteristics (CE Mode) of a Transistor
9. Bistable multivibrator using Transistor
10. IC – verification of Truth table – (Universal NAND & NOR)
11. IC – Verification of Demorgan's theorem
12. IC – Dual power supply
13. OP AMP – Adder, Subtractor
14. IC – Half & Full Adder
15. Ring counter
16. Logic gates – with discrete components / IC
17. FET – Characteristics
18. Voltage Trippler & Doubler
19. Shift register
20. Relaxation oscillator using UJT
21. RS, JK, D – Flip Flop

For Major Practical Examination Marks Allotment

External examination will be conducted at the even semester

Exam Duration – 3 Hrs

Internal Marks - 40
External Marks – 60
Total Marks - 100

Internal Marks:

Record – 10 Marks
Viva Voce – 10 Marks
Model Exam – 20 Marks

Total – 40 Marks

External Marks:

External Exam – 60 Marks

SEMESTER - I & III
(SEM I for B.Sc., (Chemistry) & SEM III for B.Sc., (Maths))
ALLIED PHYSICS PAPER - I

Code : AP1 **4 Hrs/Week**
Credit : 3

Unit - I: MECHANICS

Force – Conservative and non conservative forces – Friction –Coefficient of friction – Laws of friction– Acceleration down an inclined plane.

Rotational motion- Expressions for torque, angular momentum and kinetic energy of rotating rigid bodies.

FLUID MECHANICS **:**

Viscosity – Stream lined and turbulent motion – Reynold's number - Bernoulli's theorem - Statement & Proof – Application – Venturimeter and Pitot tube.

Unit - II: GRAVITATION

Kepler's laws of planetary motion- Law of gravitation – Boy's method for G- Compound pendulum - Expression for period – Experiment to find g – Variation of g with latitude, altitude and depth – Orbital velocity – Artificial satellites.

Unit - III: ELASTICITY

Elasticity – Young's Modulus – Rigidity modulus – Bulk modulus – Poisson's ratio – Bending of beams – Expression for bending moment – Determination of Young's modulus – Uniform and non-uniform bending - I – Section of girders – Torsion of a cylinder – Expression for torque per unit twist – Work done in twisting the wire – Torsional oscillations of a body– Determination of rigidity modulus of the wire by torsion pendulum.

Unit – IV: HEAT AND THERMODYNAMICS

Conduction – Coefficient of Thermal Conductivity – Lee's Disc method – Convection in atmosphere – Lapse rate - Radiation – Stefan's law – Stefan's constant – Experimental determination – Solar constant - Temperature of the Sun.

Zeroth, I, II and III law of thermodynamics – Carnot's engine – Efficiency – Entropy – Change in entropy in reversible and irreversible processes.

Unit – V: OPTICS

Theory of interference – Air Wedge – Newton's Rings – Diffraction - Fresnel and Fraunhofer diffraction – Transmission Grating – Polarisation – Double refraction – Nicol prism- Quarter and half wave plates.

Text Book:

1. Ancillary Physics – I Semester (Mechanics, Properties of Matter and Sound) - R.Murugesan – S.Chand & Co, 2008.
   (UNIT I,II &III)
2. Ancillary Physics – II Semester (Thermal Physics) - R.Murugesan – S.Chand & Co, 2008.
   (UNIT IV)
3. Ancillary Physics – IV Semester (Optics , Spectroscopy and Modern Physics) - R.Murugesan – S.Chand & Co, 2008.
   (UNIT V)

Unit I : 1.1,1.3,1.4,1.5,1.6,1.7,1.8,2.8,2.9,2.10,5.1,5.5,5.6,5.7.
Unit II : 3.1,3.2,3.4,3.5,3.6,3.7,3.8,3.9.
Unit III : 4.1,4.2,4.3,4.4,4.5,4.7,4.8,4.9,4.10,4.11,4.12,4.13.
Unit IV : 3.1,3.2,4.1,4.2,4.3,5.1,5.2,5.3,5.4,5.6,7.2,7.4,7.5,7.6.
Unit V : 2.1,2.2,2.4,2.5,2.8,2.9,3.1,3.2,3.4,3.5,3.

Reference:

1. Mechanics - D.S.Mathur, S.Chand & Co., 2002.
2. Properties of Matter – Brijlal and Subramanyam, S.Chand & Co., 2002.
3. Heat and Thermodynamics - Brijlal and Subramanyam, S.Chand & Co., 2006
4. Optics - Brijlal and Subramanyam, Brijlal and Subramanyam, S.Chand & Co., 2006

SEMESTER II & IV

ALLIED PHYSICS PAPER – II

(SEM II for B.Sc., (Chemistry) & SEM IV for B.Sc., (Maths))

Code : AP2 **4 Hrs./Week**

Credit : 4

Unit – I : CURRENT ELECTRICITY AND AC CIRCUITS

Kirchhoff's laws – Wheatstone's network – Condition for balance -Carey – Foster's Bridge – Measurement of Specific resistance – Potentiometer – Calibration of Voltmeter and Ammeter.

AC Circuits – Mean value – RMS value – Peak value – LCR in series – Sharpness of resonance – Chokes – Uses.

Unit – II : PHOTO ELECTRICITY

Laws of photoelectric emission – Einstein's equation – Photoelectric cells – Photoemissive cells – Photoconductive and Photovoltaic cells – Applications – Solar cell.

Unit – III : RELATIVITY

Inertial frames – Galilean transformation equations – Michelson and Morley experiment – Postulates of Special theory of Relativity – Lorentz transformation (no derivation) - Length contraction – Time dilation – Mass energy equivalence.

Unit – IV : ELECTRONICS

Junction diode – Biasing – Bridge rectifier – Transistor – Transistor characteristics (CE mode) – Single stage amplifier - Oscillator – Hartley Oscillator – Modulation – Amplitude modulation – De modulation – AM detectors (diode).

Unit – V : DIGITAL ELECTRONICS

Number systems – Decimal – Binary – Binary addition and subtraction – Basic Logic Gates – Universal gates – Laws and theorems of Boolean algebra – De-Morgan's theorems.

Text Book :

1. Ancillary Physics – III Semester (Electricity and Electronics) - R.Murugesan – S.Chand & Co., 2008.
2. Ancillary Physics – IV Semester (Optics, Spectroscopy and Modern Physics) – R.Murugesan – S.Chand & Co. 2008.

Unit I : 2.1,2.2,2.3,2.5,2.6,2.7,2.8,3.11,3.15,3.20.
Unit II : 4.11,4.12,4.13,4.14.
Unit III : 5.5,5.6,5.7,5.8,5.9,5.11.
Unit IV : 4.1,4.2,4.7,4.9,4.12,4.14,4.15,4.16.
Unit V : 5.1,5.2,5.3,5.4,5.5,5.6,5.10,5.11,5.12,5.13,5.14,5.15,5.17,5.7,5.8,5.9.

Reference:

1. Electricity and Magnetism – R.Murugesan - S.Chand & Co. 2007
2. Optics, Spectroscopy and Modern Physics - R.Murugesan - S.Chand & Co.2008
3. Digital principles and application –Malvino and Leach (2000) 4th Ed, New Delhi

SEMESTER I & II (Chemistry) /

SEMESTER III & IV (Maths)

ALLIED PHYSICS PRACTICALS

Code: PPA **3 Hrs/Week**

Credit: 3

Any fourteen Only (For Two Semesters)

1. Young's Modulus – Uniform Bending (Optic lever) .
2. Young's Modulus – Non-Uniform Bending (Pin & Microscope).
3. Compound Pendulum.
4. Torsion Pendulum – Rigidity Modulus
5. Surface Tension of a liquid by Capillary Rise method.
6. Coefficient of Viscosity by Poiseullie's method.
7. Coefficient of Thermal conductivity – Lee's Disc method.
8. Newton's Law of cooling – Specific heat capacity of a liquid.
9. Carey - Foster's Bridge – Determination of specific resistance.
10. Potentiometer - Determination of specific resistance.
11. Potentiometer – Calibration of voltmeter.
12. Potentiometer – Calibration of low range ammeter .
13. Newton's Rings – Radius of Curvature of the lens.
14. Thickness of a thin wire by Air-Wedge.
15. Spectrometer - Grating – Normal incidence method.
16. Spectrometer – Dispersive power of the prism.
17. LCR – Series Resonance Circuit.
18. LCR – Parallel Resonance Circuit.
19. Junction and Zener diode – V-I Characteristics.
20. Construction of Regulated power supply using Zener diode.
21. Transistor characteristics – Common Emitter Configuration.
22. Logic gates – OR, AND, NOT (Using discrete components).
23. Logic Gates – NAND, NOR (Using discrete components).
24. Transistor – Hartley Oscillator.
25. Desauty's bridge (Series and Parallel Capacitances)
26. B.G. – C1 / C2 (or E1 / E2).
27. AC frequency-sonometer
28. Verification of Ohm's law

For Ancillary Physics Examination Marks Allotment

PPA Practical Examination :

External examination is at the end of II semester (Chemistry) IV semester (Maths) .

Exam Duration - 3 Hrs

Internal Marks - 40
External Marks - 60
Total Marks - 100

Internal Marks:

Record	-	10 Marks
Viva voce	-	10 Marks
Model Exam	-	20 Marks
Total	-	40 Marks

External Marks:

External Exam - 60 Marks

SEMESTER V

NON MAJOR ELECTIVE PAPER -1

PHYSICS OF HOME APPLIANCES

Code: NMP1 **2 hrs/week**

Credit: 2

UNIT-I: KITCHEN

Pressure cooker- Microwave oven-Refrigerator and toaster.

UNIT-II : **BATHROOM**

Geyser-Vacuum cleaner-Water purifier and washing machine.

UNIT-III: HALL AND STUDY ROOM

Air conditioner - DVD player - Remote control and fluorescent tube.

UNIT – IV: OFFICE

Fax machine- Printer- Photocopier and elevator

UNIT –V: GENERAL

Transformer –Relay- Telephone -Fuse and lightning arrestor.

TEXT BOOK: Study Material Prepared by the Department

SEMESTER VI

NON MAJOR ELECTIVE PAPER – II

SOLAR ENERGY AND ITS APPLICATIONS

Code : NMP2 **2 Hrs/Week**
Credit : 2

UNIT : I SUN

Sun - composition of sun – basic parameters of sun – layers of sun – fusion in sun – black spots – solar flares – solar wind – solar radiations.

UNIT : II ENERGY

Non - renewable energy sources – renewable energy sources – solar energy – wind energy – Bio mass energy

UNIT : III SOLAR HEATER & DRIER

Solar water heaters – Types of water heaters – construction, working, efficiency, advantages and disadvantages of flat plate collector. Solar drier – types of driers – construction, working efficiency, advantages and disadvantages of integrated solar drier.

UNIT : IV SOLAR COOKER AND SOLAR PONDS

Solar cooker – types of cookers – construction, working, efficiency, advantages and disadvantages of dish type cooker –Solar ponds- types of ponds- construction, working, efficiency, advantages and disadvantages of non-convecting solar pond.

UNIT : V APPLICATIONS OF SOLAR ENERGY

Solar refrigerator - construction, working,efficiency, advantages and disadvantages of solar refrigerator – solar photovoltaic cell - construction, working, efficiency, advantages and disadvantages of solar photovoltaic cell – solar toys – solar caps – solar mobile chargers – solar torches – solar lanterns – solar garden lights – solar street lights – solar traffic signals – solar fountains – solar pumps.

Text Book:

Energy Physics by Dr. R.V.Jebha Rajasekhar., Eden publication, Nov 2009 Edition, Madurai.

Reference:

Non Conventional energy Sources – G.D.Rai, Fifth edition (April 2011) Khanna Publisher