Fifth Meeting of the Board of Studies

Department of Physics

For the Programme

B.Sc. Physics

Venue

Physics lab, SAS Block

Sri Manakula Vinayagar Engineering College

Madagadipet, Puducherry – 605 107

Date & Time

01.09.2022 & 2.30 P.M

2.E.5.1

2.E.5.2

Minutes of Board of Studies

The Fifth Meeting of the Board of Studies of the Department of Physics was held on Thursday, the **1st September 2022 at 2.30 pm** in the Physics Lab, SAS Block, Sri Manakula Vinayagar Engineering College with the Head of the Department in the chair. The following members were present for the BoS meeting

Sl.No	Name of the Member with Designation and official Address	Responsibility in the BoS
1	**Dr. T. Jayavarthanan,** M.Sc., M.Phil., Ph.D. Professor Department of Physics, SMVEC	Chairman
External Members		
2	**Dr. B. J. Kalaiselvi,** M.Sc., M.Tech., Ph.D Professor, Department of Physics, Pondicherry Engineering College, Puducherry-605014	Pondicherry University Nominee
3	**Dr. S. Senthilnathan**, M.Sc., M.Phil., Ph.D. Professor, Department of Physics University college of Engineering, Pattukottai	Academic Council Nominee
4	**Dr. D. Manikandan**, M.Sc., M.Phil., Ph.D. Assistant Professor, Arignar Anna Govt Arts College, Villupuram	Academic Council Nominee
5	**Mr. J. Bagairathan**, M.Sc., M.Tech Manager, L.G. balakrishnan& brothers Ltd	Industrial Nominee
Internal Members		
1	Mr. K. Oudayakumar. M.Sc., M.Tech., (Ph.D)	Member
2	Dr.T. Sivaranjani M.Sc., M.Phil., Ph.D. SET	Member
3	Ms. S. Geetha M.Sc., M.Phil., B.Ed.	Member
4	Dr. K. Samuvel M.Sc., M.Phil., Ph.D	Member
Co-opted Members		
1	Dr.M.A.Ishrath Jahan M.A., M.Phil., Ph.D	Member
2	Dr. S. Savithri, M.Sc., M.Phil., Ph.D	Member
3	Mr.Shanmugam, M.Sc., M.Phil., SET	Member
4	Mr.K.Raja, M.Sc.,M.Phil	Member

AGENDA OF THE MEETING

BOS/2021/SAS/PH/U.G/ 5.1	Welcome Address, Introduction about the Institution, Department and BoS Members
5.2	Confirmation of minutes of the Fourth meeting of the Board of Studies.
5.3	To discuss and approve the improvisations in the Curriculum Structure of the Bachelor of Physics Programme (V & VI Semester)
5.4	To discuss and recommend ❖ Industrial Visit ❖ Project area of the third year students
5.5	To consider any other item with the permission of the Chair

The Chairman proceeded with the presentation to deliberate on agenda items.

BOS /2021/ SAS /PH/ UG /5.1 — **Welcome Address, Introduction about the Institution, Department and BOS Members**

The Chairman of the meeting formally welcomed the honorable members of the Board

5.2 — **Confirmation of Minutes of the BoS-4th Meeting held on 24.02.2022**

The BoS- 4rd Meeting for B.Sc. Physics under regulation 2020 held on 24-02-2022 confirmed the following points.

The BoS members discussed elaborately and reviewed the Syllabi of **Discipline Specific Core** Semesters V to VI and suggested the following modifications

S.No	Regulation	Semester	Course title with Code	Unit	Particulars
1	R 2020	V	Quantum Mechanics, relativity and mathematical methods A20PHT512		Suggested to change the title as **Relativity and Quantum Mechanics**
				IV & V	Suggested to change Unit IV and V related to quantum and Relativity.
			Solid state Physics A20PHT511	V	Suggested to include High Temperature Superconductor and applications of super conductors
2		VI	Semiconductor device Physics A20PHT614	Suggested to change the title as **Semiconductor Device** (Refer Annexure I)	
			Atomic and Nuclear Physics A20PHT613	Suggested to change the title as **Nuclear And Radiation Physics**	

2.E.5.4

The BoS members reviewed and discussed about **Discipline Specific Electives** offered in V and VI Semester Curriculum and suggested the following modifications

S.No	Regulation	Semester	Course code	Discipline Specific Elective	Particulars
1	R2020	V	A20PHE507	Digital Electronics	Suggested to change topic as A/D to D/A converter
			A20PHE508	Group theory and Spectroscopy	Suggested to give equal weightage to all Units
			A20PHE509	Nano-material	Suggested to combine Unit I & II and give Unit V as application of Nanomaterial
2		VI	A20PHE610	Astronomy and Astrophysics	Suggested to give equal weight age to all units

Minutes were Reviewed and Confirmed

5.3 **To discuss and approve the improvisations in the Curriculum Structure of the Bachelor of Physics Programme (V & VI Semester)**

The BOS members discussed elaborately and reviewed the improvised Syllabi of Semesters V to VI and suggested the following points,

- BoS members was satisfied with the Changes made in V & VI semesters as per discussion carried in the Fourth BoS
- Suggested to check the lines spacing and alignment of the syllabi (Annexure I)

5.4 **To discuss and recommend**

- ❖ Industrial Visit
- ❖ Project area of the third year students

- ➢ The Board suggested to take the students for industrial visit as per the theory papers they are studying in that semesters
- ➢ The Board suggested to pair the students in a group and to give separate field for each group like electronics, basis of nano-materials, optical and electrical properties etc. to come out with recent advancement in each fields.
- ➢ Suggested to make the students to write a project article based on their project work and make them to publish in the journal
- ➢ Further BOS members suggested signing MOUs with industries in order to ensure practical understanding of theory learning.

5.5 Any other item with the permission of chair

- ➢ The Board suggested encouraging the students to register online courses like NPTEL certification, Swayam, MOOC, etc.

The Board of Studies approved the above suggestions for B.Sc. Physics. The meeting was concluded at 4:00 pm with vote of thanks by Dr.T.Jayavarthanan, Professor, and Department of Physics.

Sl.No	Name of the Member with Designation and official Address	Responsibility in the BoS	Signature
1	**Dr. T. Jayavarthanan,** M.Sc., M.Phil., Ph.D. Professor Department of Physics, SMVEC	Chairman	
External Members			
2	**Dr. B. J. Kalaiselvi,** M.Sc., M.Tech., Ph.D Professor, Department of Physics, Pondicherry Engineering College, Puducherry-605014	Pondicherry University Nominee	
3	**Dr. S. Senthilnathan,** M.Sc., M.Phil., Ph.D. Professor, Department of Physics University college of Engineering, Pattukottai	Academic Council Nominee	
4	**Dr. D. Manikandan,** M.Sc., M.Phil., Ph.D. Assistant Professor, Arignar Anna Govt Arts College, Villupuram	Academic Council Nominee	
5	**Mr. J. Bagairathan,** M.Sc., M.Tech Manager, L.G. balakrishnan& brothers Ltd	Industrial Nominee	
Internal Members			
1	Mr. K. Oudayakumar. M.Sc., M.Tech	Member	
2	Dr.T. Sivaranjani M.Sc., M.Phil., Ph.D.	Member	
3	Ms. S. Geetha M.Sc., M.Phil., B.Ed.	Member	
Co-opted Members			
1	Dr.M.A.Ishrath Jahan M.A., M.Phil., Ph.D	Member	23/9/22
2	Dr. S. Savithri, M.Sc., M.Phil., Ph.D	Member	
3	Mr.Shanmugam, M.Sc., M.Phil., SET	Member	
4	Mr.K.Raja, M.Sc.,M.Phil	Member	

23/9

DEAN SAS
(Dr.S.Muthulakshmi)

Dr.T.Jayavarthanan
Professor / Physics
Chairman –BOS

2.E.5.b

SCHOOL OF ARTS AND SCIENCE

Department of Physics

Curriculum

Annexure - I

2.E.5.7

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE
(An Autonomous Institution)
(Approved by AICTE, New Delhi and Affiliated to Pondicherry University)
(Accredited by NBA-AICTE, New Delhi and Accredited by NAAC with "A" Grade)
Madagadipet, Puducherry

SCHOOL OF ARTS AND SCIENCE

BACHELOR OF SCIENCE
IN
PHYSICS

ACADEMIC REGULATIONS 2020
(R-2020)
CURRICULUM AND SYLLABI

B.Sc Physics

2.E.5.9

COLLEGE VISION AND MISSION

Vision

To be globally recognized for excellence in quality education, innovation and research for the transformation of lives to serve the society.

Mission

M1: Quality Education:

To provide comprehensive academic system that amalgamates the cutting edge technologies with best practices.

M2: Research and Innovation:

To foster value based research and innovation in collaboration with industries and institutions globally for creating intellectuals with new avenues.

M3: Employability and Entrepreneurship:

To inculcate the employability and entrepreneurial skills through value and skill based training.

M4: Ethical Values:

To instill deep sense of human values by blending societal righteousness with academicprofessionalism for the growth of society.

DEPARTMENT OF PHYSICS

VISION AND MISSION

Vision

To excel in quality based science education by igniting the young talented minds with novel ideas and to develop a scientific temper and a sense of social commitment in students.

Mission

M1: Preeminent Education

To impart quality education both in theoretical and experimental physics through effective Teaching Learning process and to motivate students to pursue higher studies in Physics this will improve their career forecasts.

M2: Reach global standard

To reach global standards in production and value based living through an honest and scientific approach

M3: Ethical Responsibility

To create a sense of ethical responsibilities among the students

2.E.5.10

STRUCTURE FOR UNDERGRADUATE PROGRAMME

Sl. No	Course Category	Breakdown of Credits
1	Modern Indian Language (MIL)	6
2	English (ENG)	6
3	Discipline Specific Core Courses (DSC)	73
4	Discipline Specific Elective Courses (DSE)	16
5	Inter-Disciplinary Courses (IDC)	20
6	Skill Enhancement Courses (SEC)	10
7	Employability Enhancement Courses (EEC*)	--
8	Ability Enhancement Compulsory Courses (AECC)	4
9	Open Elective (OE)	4
10	Extension Activity (EA)	1
Total		**140**

SCHEME OF CREDIT DISTRIBUTION – SUMMARY

Sl.No	Course Category	Credits per Semester						Total Credits
		I	II	III	IV	V	VI	
1	Modern Indian Language (MIL)	3	3	-	-	-	-	6
2	English (ENG)	3	3	-	-	-	-	6
3	Discipline Specific Core Courses (DSC)	10	10	10	10	16	17	73
4	Discipline Specific Elective Courses (DSE)	-	-	4	4	4	4	16
5	Inter-Disciplinary courses (IDC)	4	6	5	5	-	-	20
6	Skill Enhancement Courses (SEC)	2	-	2	2	2	2	10
7	Employability Enhancement Courses (EEC*)	-	-	-	-	-	-	-
8	Ability Enhancement Compulsory Courses (AECC)	2	2	-	-	-	-	4
9	Open Elective (OE)	-	-	2	2	-	-	4
10	Extension Activity (EA)	-	1	-	-	-	-	1
Total		**24**	**25**	**23**	**23**	**22**	**23**	**140**

**** EEC will not be included for the computation of "total of credits" as well as "CGPA"***

B.Sc Physics

2.E.5.11

2.E.5.12

SEMESTER – V										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20PHT510	Atomic and Molecular Spectroscopy	**DSC**	3	1	0	4	25	75	100
2	A20PHT511	Solid state Physics	**DSC**	3	1	0	4	25	75	100
3	A20PHT512	Relativity and Quantum Mechanics	**DSC**	3	1	0	4	25	75	100
4	A20PHEXXX	Discipline Specific Elective-III**	**DSE**	3	1	0	4	25	75	100
Practical										
5	A20PHL505	Physics Practical V	**DSC**	0	0	4	2	50	50	100
6	A20PHL506	Physics Practical VI	**DSC**	0	0	4	2	50	50	100
Skilled Enhancement Course										
7	A20PHS504	Renewable Energy and Energy Harvesting	**SEC**	2	0	0	2	100	0	100
Employability Enhancement Course										
8	A20PHC505	Basics of Python	**EEC**	2	0	2	0	100	0	100
			Fifth Semester Total				22	400	400	800

Discipline Specific Electives are to be selected from the list given in Annexure II

2.E.5.13

2.E.5.14

SEMESTER – VI										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20PHT613	Nuclear& Radiation Physics	**DSC**	3	1	0	4	25	75	100
2	A20PHT614	Semiconductor Device	**DSC**	3	1	0	4	25	75	100
3	A20PHEXXX	Discipline Specific Elective – IV**	**DSE**	3	1	0	4	25	75	100
Practical										
4	A20PHL607	Physics Practical VII	**DSC**	0	0	4	2	50	50	100
5	A20PHL608	Physics Practical VIII	**DSC**	0	0	4	2	50	50	100
Project										
6	A20PHP601	Project	**DSC**	0	0	10	5	40	60	100
Skilled Enhancement Course										
7	A20PHS605	Weather Forecasting	**SEC**	2	0	0	2	100	0	100
Employability Enhancement Course										
8	A20PHC606	Data Science using Python	**EEC**	2	0	0	0	100	0	100
			Sixth Semester Total				23	415	385	800

***Discipline Specific Electives are to be selected from the list given in Annexure II*

2.E.5.16

DISCIPLINE SPECIFIC ELECTIVE COURSES**

Discipline Specific Elective – III (Offered in Semester V)		
1	A20PHE507	Digital Electronics
2	A20PHE508	Group Theory and Spectroscopy
3	A20PHE509	Nanomaterial
Discipline Specific Elective – IV (Offered in Semester VI)		
Sl. No.	**Course Code**	**Course Title**
1	A20PHE610	Astronomy and Astrophysics
2	A20PHE611	Geo Physics
3	A20PHE612	NumericalMethods&Basic ComputerProgramming

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SEMESTER - V

A20PHT510	ATOMIC AND MOLECULAR SPECTROSCOPY	L	T	P	C	Hrs
		3	1	0	4	60

Course Objectives

- To understand the concepts of atomic structure
- To explain the concepts of Discharge Phenomenon
- To elaborate the Energy levels
- To know the basic knowledge about the Photoelectricity
- To understand the concepts of spectroscopy

Course Outcomes

After the completion of this course, students will be able to

CO1 – Acquire knowledge through discharge phenomenon through gases
CO2 – Get the basic knowledge of atomic structure
CO3 – Acquire knowledge ionization potential and splitting of energy levels
CO4- Acquire knowledge ionization potential and splitting of energy levels
CO5 – Understand the Fundamental knowledge of Spectroscopy

UNIT- I: DISCHARGE PHENOMENON THROUGH GASES (12Hrs)

Motion of a charge in transverse electric and magnetic fields–specific charge of electron–Dunnington's method – Magnetron method – positive rays – Thompson parabola method – Aston and Dempster's mass spectrograph.

UNIT- II: ATOMIC STRUCTURE (12Hrs)

Vector atom model – Pauli's exclusion principle – explanation of periodic table – various quantum numbers – angular momentum and magnetic moment – coupling schemes – LS and JJ coupling – spatial quantization – Bohr magnetron Spectral terms and notations – selection rules – intensity rule and intervalrule.

UNIT- III: IONISATION POTENTIAL AND SPLITTING OF ENERGY LEVELS (12Hrs)

Excitation and ionization potential–Davis and Goucher's method–Zeeman effect–Larmor's theorem – Debye's explanation of normal Zeeman effect – Anomalous Zeeman effect – theoretical explanation-Lande's'g' factor and explanation of splitting of D1 and D2 lines of sodium – Paschen Back effect–theory–Stark effect (Qualitative treatment only)

UNIT - IV: PHOTO ELECTRICITY (12Hrs)

Photoelectricity: Photoelectric emission laws–Lenard's experiment - Richardson and Compton experiment- Einstein photoelectric equation -experimental verification of Einstein's photoelectric equations by Millikan's experiment.

UNIT-V: SPECTROSCOPY (12Hrs)

Infrared spectroscopy ,RAMAN, NMR, ESR – Principle – Instrumentation – applications - LASER, Principles of LASER, Semiconductor diode Laser, Nd-Yag Laser, Co_2 Laser - Applications

Text Books

1. R.Murugeshan, *Modern Physics*,S.Chand &Co.,NewDelhi,2009.
2. N.Subramanian and BrijLal,*Atomic and Nuclear Physics*, S.Chand&Co.,2013.
3. J.B.Rajam,*AtomicPhysics*,S.ChandPublishingCo.,2010

Reference Books

1. Lipson SG,Lipson H and Tannhauser DS, *Optical Physics,* Cambridge University Press,1995.
2. Raj MG, *Fundamentals of Optics*, Anmol Publications Pvt.Ltd, New Delhi, 1996.
3. G.Aruldhas, *Spectroscopy*, Vendeur Book Vistas (New Delhi, India),2009.

2.E.5.20

A20PHT511	SOLIDSTATE PHYSICS	L	T	P	C	Hrs
		3	1	0	4	60

Course Objectives

- To understand the concepts of bonding
- To explain the concepts of diffraction in solids
- To demonstrate the magnetism properties in solids
- To know the basic knowledge about the dielectrics
- To understand the concepts of superconductivity

Course Outcomes

After the completion of this course, students will be able to

CO1 - Learn the Fundamental of Bonds in Solids
CO2 - Learn the concepts of X-ray diffraction its applications in solids
CO3 - Understanding the properties of Magnetism and its applications
CO4- Acquiring the knowledge of Dielectrics and its properties
CO5 - Gain the knowledge of Superconductivity and its applications

UNIT- I: BONDS IN SOLIDS (12Hrs)

Crystal lattice- primitive and unit cell- seven classes of crystals– Bravais lattice- Miller indices-structure of crystals- simple cubic, Hexagonal close packed structure-Face centered cubic structure, Body centered cubic structure, Simple cubic structure-Sodium chloride structure, Zinc Blende structure, Diamond structure

UNIT- II: X – RAY DIFFRACTION (12Hrs)

Diffraction of x-rays by crystals - Bragg's law in one dimension-Experimental method in x-ray diffraction-Laue method, Rotating crystal method - Powder photograph method – von Laue's equations – Point defects – Line defects – Surface defects – Volume defects-Effects of crystal imperfections

UNIT - III: MAGNETISM (12Hrs)

Different type of magnetic materials- Classical theory of Diamagnetism (Langevin theory)-Langevin theory of Paramagnetism – Weiss theory of Paramagnetism- Qualitative explanation of Heisenberg's Internal Field and Quantum Theory of Ferromagnetism.

UNIT - IV: DIELECTRICS (12Hrs)

Fundamentals definitions in dielectrics–different types of electric polarization-Frequency and Temperature Effects on Polarization – Dielectric loss – Local Field on internal field Clausius-Mosotti Relation- Determination of Dielectric Constant – Dielectric Breakdown – Properties of Different types of insulating materials

UNIT- V: SUPERCONDUCTIVITY (12Hrs)

Introduction- Meissner effect – Limitation – Type I & II Superconductivity – High Temperature Superconductor – Vortex states – BCS Theory (Qualitative treatment only) - Josephson's effect-Copper pair tunneling.

Text Books

1. K.Ilangovan, *Solid State Physics*, MJP Publication, 2012.
2. S.O.Pillai, *Solid State Physics,* New Age Science Publication, 2009.
3. Arumugam, *Materials Science*, Anuradha Publications, 2015.

Reference Books

1. C.Kittel, *An introduction to Solid State Physics,* 5th Edition, Published by John Wiley & Sons Inc,1976.
2. Dekker A.J. *Solid State Physics*, Mac Millon Ind.Ltd.,1985.
3. Ascroft &Mermin, *Solid State Physics*, Pacific Grove,CA:Brookscole,1976.

2.8.5.21

2.E.5.22

		L	T	P	C	Hrs
.A20PHT512	RELATIVITY AND QUANTUM MECHANICS	3	1	0	4	60

Course Objectives

- To know the basics of mathematical methods
- To explain the principle of relativity
- To know the basic details about the wave Mechanics
- To understand the concepts of mathematical Physics
- To understand the special functions

Course Outcomes

After the completion of this course, students will be able to

CO1 – Understand the concept of Relativity and its special
CO2 – Learn the principles of time dilation
CO3 – Understand the de-Broglie and Heisenberg principle
CO4 – Understand the applications of Schrodinger wave equations
CO5 – Gain the knowledge about the concepts in Quantum mechanics

UNIT - I: SPECIAL RELATIVITY (12 Hrs)

Inertial Frames, Principle of Relativity, Lorentz Transformations – Space time, Coordinates and Invariance- Relativistic Kinematics and Dynamics- Variational Principle for Free Particle Motion, Light Rays

UNIT - II: RELATIVITY **(12 Hrs)**

Michelson – Morley experiment – significance of negative result – postulates of special theory of relativity–Length contraction–Time dilation – Relativity of simultaneity – Law of addition of velocities – variation of mass with velocity –relativistic kinetic energy equations – postulates of general theory of relativity – gravitational red shift.

UNIT- III: WAVE MECHANICS **(12 Hrs)**

Matter Waves – de Brogile wavelength–wave velocity and group velocity–Heisenberg's Uncertainty principle – proof of Uncertainty principle for one dimensional wave packet – postulates of wave mechanics–properties of wave function–operator formalism (Basics only) – Eigen functions – Eigen values–expectation values.

UNIT- IV: SCHRODINGER EQUATIONS AND ITS APPLICATIONS **(12 Hrs)**

Schrodinger equation–time dependent and time independent – application of Schrodinger equations – linear harmonic oscillator – zero point energy – particle in a one dimensional box –barrier penetration and tunneling effect rigid rotator –hydrogen atom.

UNIT-V: CONCEPTS IN QUANTUM MECHANICS **(12 Hrs)**

Elementary concept of spin, Pauli Matrices and spin wave functions. Total angular momentum. Time-independent, non-degenerate, first – order Perturbation Theory, Spin – Orbit coupling. Ground and excited states of Helium atom and exchange degeneracy.

Text Books

1. V.Devanathan,*Quantum Mechanics*,Narosa,Chennai,2005.
2. R.Murugeshan, Kiruthigs, Sivaprasath, *Modern Physics,* SChand&Co.,2007.
3. V.K.Thangappan, *QuantumMechanics*,Wiley Eastern,1985.

Reference Books

1. B.D.Gupta, *Mathematical Physics,* Vikas Publishing House; Fourth Edition,2009.
2. Ghatak and Loganathan, *Quantum Mechanics*, McMillan,2004.
3. A.Ghatak, *Basic Quantum Mechanics*, Mc Millan India,2002.

B.Sc Physics

9.E.5.23

2.E.5.24

DISCIPLINE SPECIFIC ELECTIVE

A20PHE507 **DIGITAL ELECTRONICS**

L	T	P	C	Hrs
3	1	0	4	60

Course Objectives

- To understand the fundamental concepts of digital
- To explain the Logic circuits
- To know the basic knowledge arithmetic circuits
- To know basic principles of A/D and D/A converters
- To understand the concepts of microprocessors

Course Outcomes

After the completion of this course, students will be able to

CO1 - Learn the Fundamental of Digital electronics & Microprocessor
CO2 - Study the functions of Boolean algebra
CO3 - Obtaining the knowledge about Arithmetic circuits & Sequential Logic circuits
CO4 - Learn about the working of D/A & A/D Converters
CO5 - Introduce the concepts and working of microprocessor 8085

UNIT- I: DIGITAL FUNDAMENTALS (12 Hrs)

Number systems – decimal, binary, octal and hexadecimal systems – conversion from one number system to another Codes – BCD code – excess 3 code, Gray code – ASCII code – Binary arithmetic – Binary addition – subtraction – unsigned binary numbers – sign magnitude numbers – I's and 2'scomplement–Binary multiplication and division.

UNIT- II: BOOLEAN ALGEBRA AND SIMPLIFICATION OF LOGIC CIRCUITS (12 Hrs)

Laws and theorems of Boolean algebra – De Morgan's theorems and their circuit implications –Duality theorem, simplification of Boolean equations –Karnaugh map – pairs,quads,octets–2,3 and 4 variables–SOP method–NAND–NAND circuits–POS method–NOR–NOR circuits.

UNIT- III: ARITHMETIC CIRCUITS ANDSEQUENTIAL LOGIC CIRCUITS (12Hrs)

Arithmetic building blocks – Half adder – Full adder – parallel binary adder – Half subtractor – Fullsubtractor–Theadder-subtractor–digitalcomparator–paritychecker/generator.Flip-flops–JKflip flop – JK master slave flip-flop –Flip flop applications. Shift register functions- Shift right-shift left-Shift register applications.

UNIT- IV: A/D AND D/A CONVERTERS (12Hrs)

Introduction–variableresistornetwork–binaryladder–D/Aconverter–D/Aaccuracyandresolution–A/Dconverter–simultaneousconversion–A/Daccuracyand resolution A/D converter applications, D/A applications.

UNIT- V: INTRODUCTION TO MICROPROCESSOR 8085 (12Hrs)

Basics of semiconductor memory- RAM, ROM, PROM and EPROM. Micro computer organization- 8085 Microprocessor – pin functions – architecture – machine and assembly language-programmer's model of 8085-8085 addressing modes. Classification of instruction and format – 8-bit data transfer and arithmetic instructions.

TextBooks

1. Arul Thalapapathi, *Fundamentals of Digital Computers*, Comptek Publishers, Chennai, 1995.
2. Vijayendran, *Fundamentals of Microprocessor 8085*, S.Viswanathan Printers & Publishers Pvt.Ltd,2006.
3. Vijayendran, *Integrated Electronics*, Viswanathan, S., Printers & Publishers Pvt.Ltd., 2009.

ReferenceBooks

1. Malvino and Leech, *Digital Principles and Application*, 4thEdition,Tata Mcgraw Hill, New Delhi, 2000.
2. Millman and Halkias *Integrated Electronics*, International Edition, Mc Graw Hill, New Delhi,1972.
3. T.C.Bartee, *Computer Architecture and Logic Design*, McGraw Hill,1991.

B.Sc Physics

2.E.5.25

2.E.5.26

A20PHE508	GROUP THEORY AND SPECTROSCOPY	L	T	P	C	Hrs
		3	1	0	4	60

Course Objectives

- To understanding of Physical aspects of quantum Mechanics
- To know the physical aspects of molecular electronic structure
- To understanding the mathematical aspects of quantum Mechanics
- To demonstrate the mathematical aspects of electronic structure
- To expose students to quantum mechanical operators and related mathematical topics.

Course Outcomes

After the completion of this course, students will be able to

CO1 – Acquire knowledge in quantum mechanics, group theory and molecular spectroscopy
CO2– Ability to know the socially intelligent with good SIQ (Social Intelligence Quotient) and EQ
CO3 – Gain the knowledge of computational thinking
CO4 – Abele to apply theory to support experimental results
CO5 – Ability to know the vibrational analysis

UNIT - I: GROUP THEORY (12Hrs)

Introduction to group theory, Properties of a group, Subgroup and Class, Symmetry elements and operations, Symmetry point groups, Matrix representation of groups, Operators and basic functions

UNIT - II: SYMMETRY (12 Hrs)

Symmetry of Hamiltonian Operator, Unitary and Similarity transformation, Reducible and Irreducible representations, Great Orthogonality Theorem and its consequences, Character tables, Wave functions as bases for irreducible representation, direct product and significance.

UNIT - III: SPECTROSCOPY (12Hrs)

Einstein A and B coefficients, dipolar interaction between light and matter – time dependent perturbation approach, Weak and strong field interaction, Transition probability and Transition moment integral, Fermi's golden rule, Rabi oscillations, Spectral broadening mechanisms.

UNIT - IV: MOLECULAR SPECTROSCOPY (12Hrs)

Classification of vibrations , Energy level in molecules, Electronic transition in organic molecules Types of Molecular Spectroscopy, Recap of harmonic oscillator, Vibrations of diatomic and polyatomic molecules, Normal coordinates.

UNIT - V VIBRATIONAL SPECTROSCOPY (12Hrs)

Types of vibrational Spectroscopy Normal modes and their symmetry, Contribution of internal coordinates to normal modes, Selection rules for fundamental vibrational transitions, applications of FTIR and Raman.

Text Books

1. Spectra of Atoms and Molecules, P. F. Bernath, Oxford University Press, 2nd edn, (2005).
2. Molecular Spectroscopy, I. N. Levine, Wiley Publications, (1975).
3. Symmetry and Spectroscopy: An Introduction to Vibrational and Electronic Spectroscopy, D.C. Harris and Bertolucci, Dover.

Reference books

1. Basic Atomic and Molecular Spectroscopy, J. M. Hollas, John Wiley.
2. Chemical Applications of Group Theory, F. A. Cotton, Wiley
3. Modern Raman Spectroscopy- A practical Approach, E. Smith and G. Dent, Wiley.

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2.E.5.28

		L	T	P	C	Hrs
A20PHE509	NANOMATERIALS	3	1	0	4	60

Course Objectives

- To understand the dimensionality of the object at nanoscale
- To explain the properties of the material
- To understand the size and shape controlled synthesis of nanomaterial's
- To know the applications in industry
- To know the material characterization

Course Outcomes

After the completion of this course, students will be able to

CO1 - Learn the Fundamental of definitions and development on nanomaterial
CO2 – Study the basic scale dimensional structure of the nanomaterial
CO3 – Learn the properties of the nanomaterial
CO4 – Able to know the synthesis of nanomaterial
CO5 –Able to understand the applications of nanomaterial

UNIT - I: INTRODUCTION TO NANOTECHNOLOGY (12 Hrs)

Basic Structure of Nanoparticles- Kinetics in Nanostructured Materials- Zero dimensional, size and shape of nanoparticles; one-dimensional and two dimensional nanostructures- clusters of metals and semiconductors, bio nano-particles.

UNIT - II: FABRICATION AND CHARACTERIZATION OF NANOMATERIALS (12 Hrs)

Types of Nanomaterials (Quantum dots, Nanoparticles, Nanocrystals, Dendrimers, Bucky balls, Nanotubes); Gas, liquid, and solid –phase synthesis of nanomaterials; Lithography techniques (Photolithography, Dip-pen and Electron beam lithography); Thin film deposition; Electro spinning. Bio-synthesis of nanomaterial's.

UNIT - III: PROPERTIES AND MEASUREMENT OF NANOMATERIALS (12 Hrs)

Optical Properties: Absorption, Fluorescence, and Resonance; Methods for the measurement of nanomaterials; Microscopy measurements: SEM, TEM, AFM and STM. Confocal and TIRF imaging.

UNIT - IV: NANO STRUCTURES (12 Hrs)

Carbon Nanotubes, Fullerenes, Nanowires, Quantum Dots. Applications of nanostructures. Reinforcement in Ceramics, Drug delivery, Giant magneto resistance, etc. Cells response to Nanostructures.

UNIT - V: APPLICATIONS OF NANOTECHNOLOGY

Nano electronics, Nano sensors, Nanotechnology in Diagnostics applications, Environmental and Agricultural Applications of nanotechnology, Nano technology for energy systems

Textbooks

1. The Physics and Chemistry of NanoSolids by Frank J. Owens and Charles P. Poole Jr, Wiley-Interscience, 2008.
2. Nanomaterials- Synthesis, Properties and Applications, Edited by A.S. Edelstein and R.C. Cammarata, Institute of Physics Publishing, London, 1998 (paperback edition)
3. Understanding Nanomaterials, Malkiat S. Johal, 2018

Reference Books

1. Nanochemistry: A Chemical Approach to Nanomaterials, by G. Ozin and A. Arsenault, RSC Publishing, 2005
2. Nanophysics and Nanotechnology: An Introduction to Modern Concepts in Nanoscience, Edward L. Wolf, Wiley-VCH, 2nd Reprint (2005)

2.E.5.30

		L	T	P	C	Hrs
A20PHL505	PHYSICS PRACTICAL- V	0	0	4	2	30

Choose any 8 experiments from the list given below

Course Objectives

- To provide a practical understanding of some of the concepts learnt in the theory course.
- To evaluate the process and outcomes of an experiment quantitatively and qualitatively.
- To extend the scope of an investigation whether or not results come out as expected.
- To conduct an experiment collaboratively and ethically.
- To collect data and revise an experimental procedure iteratively and reflectively

Course Outcomes

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

CO 1 - Ability to know the moment of inertia. Capable of handling screw gauge, venire caliper and

CO 2 - Acquired basic knowledge about Potentiometer and magnetic field due to a current carrying coil.

CO 3 - Ability to prepare formal laboratory reports describing the results of experiments and to interpret the data from the experiments.

CO 4 - Ability to understand the ballistic galvanometer to measure the current and charge sensitivity

CO 5 – Ability to know the practical knowledge to describe the experiments and to correlate the theoretical values

LIST 0f EXPERIMENTS

1. Newton's Rings: determination of refractive index of the material of the lens.
2. Spectrometer: Hartmann's Interpolation Formula - Determination of wavelength
3. Spectrometer: i - i' curve and determination of refractive index.
4. Spectrometer Dispersive power of the material prism
5. Spectrometer: Grating – wavelength by normal incidence method
6. Young's modulus: Elliptical fringes method.
7. Field along the axis of a circular coil - Determination of moment of magnet
8. Temperature co-efficient of a Thermistor
9. Potentiometer: Verification of laws of resistance and resistivity of the material of a wire.
10. Diode laser : characteristic study

Textbooks

1. Practical Physics C.C Ouseph, V.J.Rao andV.Vijayendran
2. Practical Physics M.N.Srinivasan, (Sultan son Pubs)
3. D P Khandelwal, A Laboratory Manual for Physics for Undergraduate Students (Vani Publications, NewDelhi)
4. B Saraf et al, Physics through Experiments, Vol. II., EMF constant and varying (Vikas Publications, NewDelhi)

Reference Books

1. Olon, "Experiments in Modern Physics"
2. Adrian C. & Melissinos, Experiments in Modern Physics, (AcademicPress).

9.E.5.31

2.E.5.32

		L	T	P	C	Hrs
A20PHL506	PHYSICS PRACTICAL- VI	0	0	4	2	30

Choose any 8 experiments from the list given below

Course Objectives

- To provide a practical understanding of some of the concepts learnt in the theory course on Physics.
- To evaluate the process and outcomes of an experiment quantitatively and qualitatively.
- To extend the scope of an investigation whether or not results come out as expected.
- To conduct an experiment collaboratively and ethically.
- To collect data and revise an experimental procedure iteratively and reflectively

Course Outcomes

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

CO 1 - Ability to understand the electronic equipment's
CO 2 - Acquired basic knowledge about gates
CO 3 - Ability to prepare formal laboratory reports describing the results of experiments and to interpret the data from the experiments.
CO 4 - Ability to understand the operational Amplifier
CO 5 - Ability to know the microprocessor

LIST 0f EXPERIMENTS

1. Study of CRO.
2. Transistor characteristics – common emitter.
3. Tuned collector oscillator- Frequency measurement by CRO and Frequency counter.
4. Tuned base oscillator - Frequency measurement by CRO and Frequency counter.
5. Emitter follower.
6. Basic Logic and Universal gates using diodes and transistors components.
7. NAND and NOR as universal gates using ICs
8. OP-AMP characteristics (741 IC) –parameter measurement
9. Implementation of logic expression and their simplification
10. Half-adder and full-adder

Text Books

1. Practical Physics C.C Ouseph, V.J.Rao and V.Vijayendran
2. Practical Physics M.N.Srinivasan, (Sultan son Pubs)
3. Jain R.P, Anand M.M.S, "Digital electronics Practice Using Integrated Circuits" (Tata McGraw-Hill, 1999, NewDelhi).
4. Zbar & Malvino, Basic Electronics-A text Lab Manual (Tats McGraw-Hill,1999)
5. Verma, Ahluwalia, Sharma, "Computational Physics, an Introduction" (New Age International)

Reference Books

1. Malvino, Electronic principles, 6th Ed. (Tata McGraw-Hill, 1999, New Delhi).
2. Takheim, Digital electronics, 3rd Ed (McGraw-Hill International).

2.E.5.33

2.E.5.34

SEMESTER – VI

A20PHT613	NUCLEAR & RADIATION PHYSICS	L	T	P	C	Hrs
		3	1	0	4	60

Course Objectives

- To demonstrate a knowledge of fundamental aspects of the structure of the nucleus
- To know various mechanisms for interaction between ionizing radiation and matter,
- To understand the introduction of radiation
- To know the applications such as detection of radiation, analytical methods, nuclear power generation,
- To Constituents and properties of nuclei, nuclear reactions and accompanying radiations

Course Outcomes

After the completion of this course, students will be able to

CO1 - Able to understand the Basic concept Nuclear Structure
CO2 - Acquire knowledge about Radio Active Decay
CO3 - Understanding the Construction & Working of various Particle Accelerators
CO4 - Able to know the Working of Nuclear reactors & Radiation
CO5 - Understand the Basic Classification of Elementary Particles

UNIT-1: NUCLEAR STRUCTURE (12Hrs)

Nuclear spin – determination of magnetic dipole moment, electric quadruple moment, parity of nuclei, isospin, theories of nuclear composition, proton and electron hypothesis ,proton–neutron hypothesis, nuclear forces–meson theory of nuclear forces. Liquid drop model – Be the Weizacker's mass formula – application to alpha decay – Bohr Theory – shell model – evidences – theory

UNIT-II: RADIOACTIVE DECAY (12 Hrs)

Radioactive disintegration – law of successive disintegration – transport and secular equilibrium – radioactive series – Geiger – Nuttal law – Age of earth – alpha particle disintegration energy – alpha particle spectra – theory of alpha decay(Qualitative treatment).Beta ray spectra – origin – neutrino theory of beta decay– gamma rays – determination of wavelength by Diamond–crystal spectrometer

UNIT-III: PARTICLE ACCELERATORS AND DETECTORS (12 Hrs)

Cyclotron – synchrocyclotron – Betatron – electron synchrotron – proton synchrotron (Bevatron)-GM counter – ionization chamber – bubble chamber – scintillation counter – photographic emulsion techniques.

UNIT-IV: REACTORS AND RADIATION PHYSICS (12 Hrs)

Nuclear fission–Chain reaction–four-factor formula–reactor theory–critical size of a reactor
Control – classification of reactors – Pressurized heavy water reactor – fast breeder reactor - Introduction to recent reactors. Radiation hazards–biological effects of radiation- radiation sickness— radioisotopes used for therapy –nuclear medicine – industrial applications.

UNIT-V: ELEMENTARY PARTICLES (12 Hrs)

Classification – types of interaction – symmetry and conservation laws – hadrons–leptons–baryons–mesons–strangeness–hyperons– antiparticles – antimatter – basic ideas about quarks–types of quarks.

Text Books

1. Brijlal and N.Subramaniam-Modern Physics
2. D.C.Tayal, *Nuclear Physics*, Himalaya Publishing House, 2011.
3. R.Murugeshan, *Modern Physics* S.Chand & Co., 2009.

Reference Books

1. S.N.Ghoshal, *Nuclear Physics,* SChand & Co.Edition, 2003.
2. M.L.Pandya,R.P.S.Yadav,*Elements of Nuclear Physics*, Kedar Nath & Ram Nath Publishers, 2000.

2.E.5.36

A20PHT614	SEMICONDUCTOR DEVICE	L	T	P	C	Hrs
		3	1	0	4	60

Course Objectives

- To introduce semiconductor fundamentals.
- To learn the number system, arithmetic operation and sequential codes of digital electronic circuits.
- To introduce the fundamental concepts and working principle of JT, FET.
- To learn the basic Boolean laws, K-maps, SOP and POS method to design logic circuits.
- To understand combinational and sequential circuits.

Course Outcomes

After completion of the course, the students will be able to

CO1 - Demonstrate and analyze the behavior of semiconductor devices
CO2 - Able to get an insight about junction theory.
CO3 - Analyze and develop new application diodes
CO4 - Solve the sequential codes based problems of digital electronics
CO5 - Ability to understand and analyze Sequential circuits

UNIT-1: SEMICONDUCTOR FUNDAMENTALS **(12Hrs)**

Intrinsic and extrinsic Semiconductors, elemental and compound Semiconductor, Carrier Concentration and Fermi Level of intrinsic and extrinsic semiconductor, Thermal Effect, conductivity and carrier mobility in semiconductors, Hall effect.

UNIT-2: JUNCTION THEORY **(12Hrs)**

PN Junction ,Junction Potential, biasing of PN junctions, I-V relationships, static & dynamic resistances, Breakdown Phenomena- avalanche and zener Processes, zener diode.

UNIT-III: APPLICATION OF DIODES: **(12Hrs)**

Sinusoidal inputs, Rectifiers (half full wave), ripple factor, power supply filtering, circuit applications of diodes, clippers, clampers, Inductive loads and diode protection

UNIT-IV: TRANSISTORS DEVICE **(12Hrs)**

Bipolar junction transistors, fundamentals of operation,(CB,CE,CC configuration), Transistors parameters, leakage current, biasing Amplification, field effect transistors (FET).

UNIT-V: COMBINATIONAL AND SEQUENTIAL CIRCUITS: **(12Hrs)**

Basic theorems and properties of Boolean algebra, logic operation, digital logic gates, combinational circuits: adder and subtractor, comparator, decoder, encoder, multiplexer de-multiplexer .sequential circuits-flip flops-SR, D, JK and T

Text Books

1. Kanaan Kano, semiconductor Devices, PHI, 2005.
2. S.O.Pillai, Solid state Physics, NewAge International Pvt.Ltd, 7th Edition 2015.
3. M.Morris Mano, Digital logic and Computer design, Pearson.

Reference Books

1. Robert Boylestad, Electronic Devices and circuit Theory, Pearson (Tenth Edition).
2. Pallab Bhattacharya, semiconductor optoelectronic Devices, PHI, 2004.
3. M.S.Tya. semiconductor physics and devices, John Wiley sons, 2004.

B.Sc Physics

2.E.5.38

DISCIPLINE SPECIFIC ELECTIVE

A20PHE610	ASTRONOMY AND ASTROPHYSICS	L	T	P	C	Hrs
		3	1	0	4	60

Course Objectives

- To know the history of the astronauts.
- To provide the knowledge about the astronomical related mechanics.
- To introduce learn the concepts of the stellar principles.
- To provide the understanding of astronomical instrumentation.
- To understand the evolution of solar system.

Course Outcomes

After completion of the course, the students will be able to

CO1 – Study about the History of Astronomy and Celestial Mechanics
CO2 – Learn the concepts of astronomical instrumentation
CO3 – Acquire Knowledge of Stellar Magnitudes and Colors
CO4 – Be familiar with the stellar structure
CO5 – Apply the knowledge of stellar evolution

UNIT- I ASTRONOMY (12Hrs)

History of Astronomy solar systems, relativity and cosmology, Celestial Mechanics; Distances in Astronomy; Magnitude Scale; Color-index Size and Time Scales, Examining rocks, terrain and material in space

UNIT - II ASTRONOMICAL INSTRUMENTATION (12Hrs)

Basic Optics; Spectrograph, Cosmic origin spectrograph and Space Telescope Imaging Telescope Optical Telescopes; Radio Telescopes; Infrared, Ultraviolet, X-ray, and Gamma-Ray Astronomy, image processing techniques.

UNIT - III STARS (12Hrs)

Stellar Magnitudes and Colors, Brightness and distance, Luminosity, temperature and spectral class, the motion of stars relative to the Sun, the masses of stars, types of stars.

UNIT – IV STELLAR STRUCTURE (12Hrs)

Equations of Stellar Structure– Solutions to Equations of Stellar Structure, Toy Stellar Models: Homologous Stellar Models, the Radiative Stellar Envelope, and Fully Convective Stars with H ~ Opacity, Observational Aspects of Stellar Atmospheres, Continuum Radiation, and Lines

UNIT - V STELLAR EVOLUTION (12Hrs)

Stellar evolution theory and stellar, elements of stellar evolution, Clusters Evolution of massive stars, Supernovae, Gamma-Ray bursts White Dwarfs, Chandrasekhar Limit, Neutron Stars, Pulsars GTR, Black holes.

Text Books:

1. Bradley Carroll & Dale Ostlie, An Introduction to Modern Astrophysics, 2006.
2. T Padmanabhan, Theoretical Astrophysics: Vol.I-II-III, Cambridge University Press(2005).
3. WM Smart and RM Greene,Textbook on Spherical Astronomy, Cambridge University Press (1986) Sixth Edition.

Reference Books:

1. Chandrasekhar S, An Introduction to the Study of Stellar Structure, Dover Publications (1967).
2. Clayton DD,Principles of Stellar Evolution and Nucleo synthesis,University of Chicago Press (1983).
3. Kippenhahn and Weigert, Stellar Structure and Evolution, Springer(1990).

2.E.5.39

2.E.S.40

A20PHE611	GEOPHYSICS	L	T	P	C	Hrs
		3	1	0	4	60

Course Objectives

- To understand the physical parameters of a geothermal field.
- To relate them with geological phenomena.
- To locate or detect the presence of subsurface structures.
- To develop their careers in a wide range of fields, including natural resource exploration.
  To measure the variation of the physical properties of subsurface

Course Outcomes

After completion of the course, the students will be able to

CO1 –Able to know the information about the earth and solar system
CO2 –Understand the interpretation of Mathematical functions in geographical fields
CO3 – Obtaining the knowledge about the Magnetic field on earth
CO4 –Able to learn the concepts of Sesimology
CO5 –Understand the basics of Geodynamics

UNITI – THE EARTH IN THE SOLAR SYSTEM **(12Hrs)**

Solar System Formation, Accretion, and the Early Thermal State of the Earth-Rotation and Angular Momentum- The Sun-Planetary Formation-Early Thermal State of the Earth-Radioactive Decay-Radiometric Dating- Radioactivity as a Heat Source-Meteorites and Stony-Irons-The Terrestrial Planets-One-dimensional Earth's Structure-Lateral Heterogeneity in the Mantle

UNIT II – THE EARTH'S GRAVITATIONAL FIELD **(12Hrs)**

Global Gravity, Potentials, Figure of the Earth, Geoid-Gravitational Potential due to Nearly Spherical Body- The Poisson and Laplace Equations – Cartesian and Spherical Coordinate Systems-Spherical Harmonics - Global Gravity Anomalies - Gravity Anomalies and the Reduction of Gravity Data-Correlation between Gravity Anomalies and Topography-Flexure and Gravity.

UNIT III – THE MAGNETIC FIELD OF THE EARTH **(12Hrs)**

The Main Field-The Internal Field- The External Field-The Magnetic Induction due to a Magnetic Dipole-Magnetic Potential due to More Complex Configurations-Power Spectrum of the Magnetic Field- Downward Continuation-Secular Variation.

UNIT IV - SEISMOLOGY **(12Hrs)**

Introduction- Strain-Stress-Equations of Motion, Wave Equation, P and S-waves- From Vector to Scalar Potentials–Polarization-Solution by Separation of Variables-Plane Waves - Snell's Law-Fermat's Principle and Snell's Law- Ray Geometries of the Wave Field-Travel Time Curves and Radial Earth Structure-Surface Waves- Sensitivity Kernels-Excitation of Surface Waves-Dispersion:

UNITV – GEO DYNAMICS **(12Hrs)**

Heat Flow – Heat Flow, Geothermal Gradient, Diffusion-Thermal Structure of the Oceanic Lithosphere - Thermal Structure of the Oceanic Lithosphere (cont.)-Bending, or Flexure, of Thin Elastic Plate-The Upper Mantle Transition Zone.

Text Books:

1. Lowrie, William. Fundamentals of Geophysics. Cambridge,UK:Cambridge University Press, September1997.
2. Fowler,C.M.R.The Solid Earth: An Introduction to Global Geophysics.Second Edition. Cambridge, UK: Cambridge University Press, 2004,
3. Stacey,F.D. Physics of the Earth.3rded. Brisbane,Australia: Brook field Press,1992.

Reference Books:

1. Turcotte,Donald L.,and Gerald Schubert.Geodynamics.2nded.Cambridge,UK:Cambridge University Press, 2001.
2. Stein,Seth,and Michael Wysession.An Introduction to Seismology Earthquakes and Earth Structure.Malden, MA:Blackwell Science, 2002.

B.Sc Physics

2.E.5.42

A20PHE612	NUMERICALMETHODS&BASIC COMPUTERPROGRAMMING	L	T	P	C	Hrs
		3	1	0	4	60

Course Objectives

- To introduce semiconductor fundamentals.
- To provide the knowledge about number system, arithmetic operation and sequential codes of digital electronic circuits.
- To acquiring the knowledge about Numerical integration & Differentiation.
- To Learn the Basic of C Language
- To understand combinational and sequential circuits.

Course Outcomes

After completion of the course, the students will be able to

CO1 –To learn the Solve various Fundamental mathematical equations
CO2 –To study the functions of Interpolation methods
CO3 – To acquiring the knowledge about Numerical integration & Differentiation.
CO4 – To learn the Basic of C Language
CO5 –To know the concepts of Control Statements in C Language

UNITI - SOLUTIONOF EQUATION **(12 Hrs)**

Eigen values, Eigen vectors, Clayey Hamilton; characteristic equation of a matrix–Solution of simultaneous equations–Gauss elimination method–Gauss-Jordan method.

UNITII - INTERPOLATION **(12 Hrs)**

LinearandLagrangeinterpolation–Newton'sforward&backwardinterpolationpolynomial Equation & determination of roots–Newton-Raphson method.

UNITIII – NUMERICALINTEGRATIONANDDIFFERENTIATION **(12 Hrs)**

Trapezoidal rule – Simpson rule 1/3 & 3/8 – Solution of first & second orders differential equation: Taylor series–Euler's methods (Improved & Modified) –Solutions of forth order Runge-Kutta method.

UNITIV – DATATYPEOPERATORS **(12 Hrs)**

History & Features of C Language - Variable name – data type and sizes – declaration – arithmetic, relational and logical operators –precedence and order of evaluation.

UNITV – CONTROLSTATEMENTS **(12 Hrs)**

Unconditional control statements – GOTO and labels – Conditional control statements – simple IF, IF, ELSE, nested IF.ELSE, Else \IF ladder–switch case–break–continue statement. Looping statement – while – do. While – for – nested for loop – (**Basic Programs - Qualitative studies only)**

TextBooks

1. S.S.Sastry,*NumericalMethods*,PrenticeHallIndiaLearningPrivateLimited;Fifthedition2012.
2. Venkataraman,*NumericalMethods*,TheNationalPublishingCompany,Madras,1999.
3. Kandasamy,*Numerical Methods*, SChand&Company;Reprint6th Edition, 2006.
4. E.Balagurusamy, *ANSI-C*,McGrawHillEducationIndiaPrivateLimited;SeventhEdition,2016.

ReferenceBooks

1. SatyaPrakash,*MathematicalPhysics*,4th Ed.,SultanChand&Sons Publication,NewDelhi,2014.
2. A.Singaravelu,Numericalmethods,1st Ed.,MeenakshiPublication,TamilNadu,2008.
3. Kuo-Addison,*NumericalMethodsandComputers*,WeselyLondon,1966

2.E.5.43

2.E.5.44

A20PHL607	PHYSICS PRACTICAL- VII	L	T	P	C	Hrs
		0	0	4	2	30

Choose any 8 experiments from the list given below

Course Objectives

- To provide a practical understanding of some of the concepts learnt in the theory course on Physics.
- To evaluate the process and outcomes of an experiment quantitatively and qualitatively.
- To extend the scope of an investigation whether or not results come out as expected.
- To conduct an experiment collaboratively and ethically.
- To collect data and revise an experimental procedure iteratively and reflectively

Course Outcomes

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

CO 1 - Ability to know the thickness of the metal wire
CO 2 - Acquired basic knowledge about Cauchy's constant.
CO 3 - Ability to prepare formal laboratory reports describing the results of experiments and to interpret the data from the experiments.
CO 4 – Understand the Searls Vibrational magnetometer
CO 5 – Able to understand the Planck's constant

LIST 0f EXPERIMENTS

1. Air wedge: Determination of the thickness and insulation of the wire.
2. Spectrometer: i - i' curve for given angle of deviation method
3. Spectrometer small angle prism
4. Spectrometer: Determination of Cauchy 's constants
5. Spectrometer: Dispersive power of a grating
6. Filed along the axis of acicular coil – Determination of BH using Searle's vibration magnetometer
7. Potentiometer: Temperature coefficient of resistance of the material of a coil of wire.
8. Study of divergence of a laser beam
9. Characteristics of a solar cell
10. Determination of Planck's constant

Text Books

1. Practical Physics C.C Ouseph, V.J.Rao and V.Vijayendran
2. Practical Physics M.N.Srinivasan, (Sultan son Pubs)
3. Verma, Ahluwalia& Sharma, "Computational Physics, an Introduction" (New Age Int.)

Reference Books

1. Olon, "Experiments in Modern Physics"
2. Adrian C. & Melissinos, Experiments in Modern Physics, (Academic Press).

2.E.5.45

2. E. 5. 46

A20PHL608	PHYSICS PRACTICAL- VIII	L	T	P	C	Hrs
		0	0	4	2	30

Choose any 8 experiments from the list given below

Course Objectives

- To provide a practical understanding of some of the concepts learnt in the theory course on Physics.
- To evaluate the process and outcomes of an experiment quantitatively and qualitatively.
- To extend the scope of an investigation whether or not results come out as expected.
- To conduct an experiment collaboratively and ethically.
- To collect data and revise an experimental procedure iteratively and reflectively

Course Outcomes

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

CO 1 – Understand the basic concepts electronics
CO 2 – Able to understand the RC coupled oscillator.
CO 3 – Understand the concepts of the basic logic gates
CO 4 – Able to understand the universal logic gates and transistor characteristics
CO 5 – Understand the basic concepts of JK, RS flip flops

LIST 0f EXPERIMENTS

1. Transistor characteristics – common base
2. Power pack - construction with Bridge rectifier and IC regulator.
3. Emitter follower
4. Single stage RC coupled CE amplifier - Frequency response curve.
5. A stable –multivibrator using transistor frequency measurement
6. Basic and Universal logic gates using ICs
7. JFET characteristics.
8. OP-AMP addition, subtraction, multiplication, Integration and differentiation.
9. Arithmetic circuits using gates
10. RS, D, JK and Master Slave flip-flops

Text Books

1. Practical Physics C.C Ouseph, V.J.Rao and V.Vijayendran
2. Practical Physics M.N.Srinivasan, (Sultan son Pubs)
3. Zbar & Malvino, Basic Electronics-A text Lab Manual (Tats McGraw-Hill,1999)

Reference Books

1. Malvino, Electronic principles, 6th Ed. (Tata McGraw-Hill, 1999, New Delhi).
2. Takheim, Digital electronics, 3rd Ed (McGraw-Hill International).

2.E.5.47

2.E.5.48