FIELD VISIT

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI – 626 123.

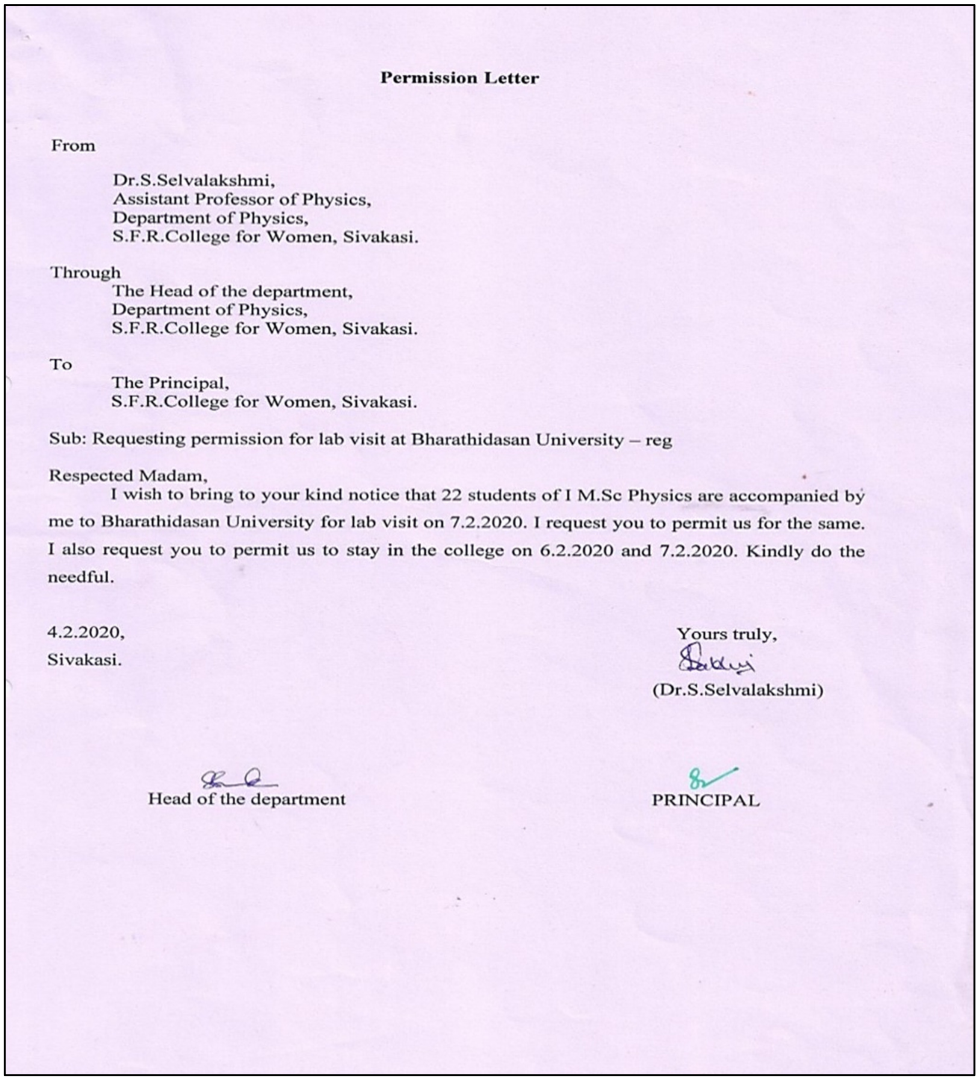
(Affiliated to Madurai Kamaraj University, Re-accredited with A Grade by NAAC,
College with Potential for Excellence by UGC and Mentor Institution under UGC PARAMARSH)

DEPARTMENT OF PHYSICS

FIELD VISIT

2019-2020

M.Sc. Physics



Permission Letter

From

Dr.S.Selvalakshmi,
Assistant Professor of Physics,
Department of Physics,
S.F.R.College for Women, Sivakasi.

Through

The Head of the department,
Department of Physics,
S.F.R.College for Women, Sivakasi.

To

The Principal,
S.F.R.College for Women, Sivakasi.

Sub: Requesting permission for lab visit at Bharathidasan University – reg

Respected Madam,

I wish to bring to your kind notice that 22 students of I M.Sc Physics are accompanied by me to Bharathidasan University for lab visit on 7.2.2020. I request you to permit us for the same. I also request you to permit us to stay in the college on 6.2.2020 and 7.2.2020. Kindly do the needful.

4.2.2020,
Sivakasi.

Yours truly,

(Dr.S.Selvalakshmi)

Head of the department

PRINCIPAL

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI – 626 123.

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DEPARTMENT OF PHYSICS

FIELD VISIT TO BHARATHIDHASAN UNIVERSITY, TRICHY

2019-2020

M.Sc. Physics

S.No	Name	Class	Roll No
1	S.Bavatarini	I-M.Sc.,	1905105
2	B.Bavithra	I-M.Sc.,	1905106
3	M.Gurupriya	I-M.Sc.,	1905111
4	K.Jeyalakshmi	I-M.Sc.,	1905112
5	V.Kanagalakshmi	I-M.Sc.,	1905123
6	K.Karpagalakshmi	I-M.Sc.,	1905126
7	A.Karthiga	I-M.Sc.,	1905122
8	M.Kaviya	I-M.Sc.,	1905102
9	A.Nithyasri	I-M.Sc.,	1905125
10	P. Pandiselvi	I-M.Sc.,	1905127
11	N.Rajeswari	I-M.Sc.,	1905117
12	P.Saranya	I-M.Sc.,	1905115
13	R.Soundarya	I-M.Sc.,	1905109
14	N.Suganya	I-M.Sc.,	1905104
15	A.Thanga Abirami	I-M.Sc.,	1905108
16	K.Thilakakani	I-M.Sc.,	1905103
17	P.Vaitheeswri	I-M.Sc.,	1905120
18	T.Victoria	I-M.Sc.,	1905121
19	S.Jenifa	I-M.Sc.,	1905124
20	D.Pavithra	I-M.Sc.,	1905101
21	S.Saranya Sivakami	I-M.Sc.,	1905107
22	C.Naveena	I-M.Sc.,	1905119

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DEPARTMENT OF PHYSICS

FIELD VISIT TO BHARATHIDHASAN UNIVERSITY, TRICHY

2019-2020

M.Sc. Physics

2019-2020

Field Visit

Place : Trichy, Bharathidhasan University.

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI – 626 123.

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DEPARTMENT OF PHYSICS

FIELD VISIT TO BHARATHIDHASAN UNIVERSITY, TRICHY

2019-2020

M.Sc. Physics

Course Syllabus

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN, SIVAKASI

DEPARTMENT OF PHYSICS

M.Sc. PHYSICS

SEMESTER – I

CORE COURSE

HLPH12- CLASSICAL AND STATISTICAL MECHANICS

(For those admitted in June 2017 and later)

Contact hours per week : 06
Contact hours per semester : 90
Total number of credits : 04

Course Outcomes (CO):

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

- CO1: define fundamental concepts of both classical and statistical mechanics
- CO2: discuss the equations of Lagrangian, Hamiltonian, canonical and different ensembles of statistical mechanics
- CO3: solve simple problems in Lagrangian formulation, canonical transformations, Poisson's bracket and statistical mechanics
- CO4: analyze various functions in classical, statistical and quantum statistical mechanics
- CO5: appraise the requisites of classical and statistical mechanics

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	0	0	1	0	0	1
CO2	3	3	0	1	0	0	1
CO3	3	9	9	3	0	0	1
CO4	3	9	9	3	0	0	1
CO5	9	9	9	3	0	0	1
Weightage of the course	**19**	**30**	**27**	**11**	**0**	**0**	**5**
Weighted percentage of Course contribution to POs	**3.65**	**5.74**	**6.4**	**5.05**	**0**	**0**	**7.58**

Unit I:

Basic Concepts of Lagrangian equation: (18hrs)

Constraints- D'Alembert's Principle and Lagrange's Equations- Velocity – Dependent Potentials and the Dissipation Function- Simple Applications of the Lagrangian Formulation- Hamilton's Principle- Derivation of Lagrange's Equations from Hamilton's Principle- Extension of Hamilton's Principle to Nonholonomic Systems.

Unit II :

Hamiltonian Methods : **(18hrs)**

Legendre Transformations and the Hamilton Equations of motion – Cyclic Coordinates and conservation theorems – Routh's Procedure – Hamilton's equations from a variational Principle – The Principle of Least action.

Unit III :

Canonical Transformations : **(18hrs)**

The equations of Canonical Transformations – Examples of Canonical Transformations - Poisson Brackets and other Canonical invariants - Equation of motion in the Poisson Bracket formulation. The Hamilton-Jacobi Equation for Hamilton's Principle Function-Hamilton –Jacobi equation for Hamilton's characteristic function.

Unit IV :

Methods of Statistical Mechanics : **(18hrs)**

Phase space –More about phase space, Ensemble and Ensemble average- Ensembles-Uses of ensembles-Density of Distribution in phase space - Liouville's Theorem – Connection between Statistical and Thermo dynamical Quantities-Micro canonical ensemble – Gibbs canonical ensemble-Grand canonical ensemble-Equipartition Theorem from canonical distribution - Thermodynamic properties of diatomic molecules – Transition from classical statistical mechanics to quantum statistical mechanics-indistinguishability and quantum statistics - Exchange symmetry of wave functions - Grand canonical ensemble and quantum statistics.

Unit V:

Quantum Statistical Mechanics: **(18hrs)**

Energy and pressure of the Bose Einstein gas- Gas degeneracy – Bose Einstein Condensation – Thermal properties of Bose Einstein gas – Liquid Helium - Energy and pressure of the Fermi dirac gas – Thermodynamic functions of degenerate Fermi dirac gas-Compressibility of Fermi gas-Electron gas – Free electron model and electronic emission-fluctuation in energy- pressure-volume-Enthalpy-Probability of one dimensional Random walk-Brownian movement.

Text Books :

1. Herbert Goldstein	-	Classical Mechanics - Narosa Publishing House – New Delhi – II Edition First Printing 1985,
Unit I	-	Chapter 1(Page no11- 29);Sections 1.3, 1,4,1.5, 1.6 Chapter 2 (Page no 35- 37 & 43- 51) Sections 2.1,2,3, 2.4
Unit II	-	Chapter 8: Sections 8.1(Page no 339-343),

		Sections 8.2 (Page no347-352), Sections 8.3, 8.5, 8.6 (Page no 362-371)
Unit III	-	Chapter 9: Sections 9.1, 9.2, 9.4, 9.5 (Page no 378-390, 397-416) Chapter 10: Section 10.1, 10.3 (Page no 438-442, 445-449)
2. Gupta & Kumar	-	Statistical Mechanics Pragati Prakashan, Meerut Twenty First Edition 2006
Unit IV	-	Chapter 1:Sections : 1.1 – 1.5, 1.7, 1.14 (Page no 71-79, 82-86, 90-92) Chapter 3:Sections : 3.0 – 3.2 – 3, 3.4,3.6 (Page no 124- 156, 161-167, 169-175) Chapter 5:Sections : 5.2– 5.4 (Page no189-192) Chapter 6:Section : 6.11(Page no 226-227)
Unit V	-	Chapter 8:Sections : 8.0 – 8.4 (Page no 242- 260) Chapter 9:Sections : 9.0 – 9.4 (Page no 261 - 273) Chapter 12:Sections : 12.0 -12.6 (Page no 303-309)

Reference Book :

Agarwal and Eisner	–	Statistical Mechanics Wiley Eastern Limited, New Age International Limited, Third Reprint 1994

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN, SIVAKASI

DEPARTMENT OF PHYSICS

M.Sc. PHYSICS

SEMESTER – I

CORE COURSE

HLPH13 – Linear Integrated Circuits

(For those admitted in June 2017 and later)

Contact hours per week : 06
Contact hours per semester : 90
Total number of credits : 04

Course Outcomes (CO):

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

CO1: list the various steps in fabrication of semiconductors, basic information of op-amp, comparator, timer and phase locked loops
CO2: explain the characteristics of op-amp and operation of 555 timer
CO3: use op-amp for different applications and construct active and passive components
CO4: analyze waveform generators, detectors, oscillators, op-amp, filters, multivibrators and fabrication technology of ICs.
CO5: discuss the working of op-amp, 555 timer and phase locked loop with necessary diagrams

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	3	3	0	0	0	1
CO2	3	3	3	0	0	0	1
CO3	3	3	9	1	0	0	1
CO4	9	3	3	1	0	0	1
CO5	3	3	3	1	0	0	1
Weightage of the course	**19**	**15**	**21**	**3**	**0**	**0**	**5**
Weighted percentage of Course contribution to POs	**3.65**	**2.87**	**4.98**	**1.38**	**0**	**0**	**7.58**

Unit I:

Integrated circuit fabrication: **(18hrs)**

Introduction-Classification-Fundamentals of Monolithic IC Technology-Basic Planar Processes-Silicon Wafer Preparation-Epitaxial Growth-Oxidation-Photolithography-Diffusion-Ion Implatation-Isolation Techniques-Metallization-Assembly Processing and Packaging-Fabrication of a Typical Circuit-Active and Passive Components for IC's-Monolithic Transistors-Monolithic Diodes-Integrated Resistors-Integrated Capacitor-Integrated Inductors-Fabrication of FET's-JFET Fabrication-MOSFET Fabrication-Complementary MOSFET (CMOS) Fabrication-Thin and Thick Film Technology-Deposition of thin film-Thick Film Technology-Surface Mount Technology (SMT)

Unit II:

Operational Amplifier: **(18hrs)**

Introduction - Basic information of Op-Amp-The ideal operational amplifier-Open loop operation of Op-Amp- Open Loop Operation of Op-Amp-Feedback in ideal Op-Amp-The Inverting Amplifier-The Non Inverting Amplifier-Differential Amplifier-Common Mode Rejection Ratio-Circuit for Improving CMRR-Input Resistance- -Motorola MC1530 Op-Amp-741 Op-Amp.

Unit III:

Operational amplifier applications: **(18hrs)**

Introduction-Basic Op-Amp Applications -Instrumentation Amplifier-AC Amplifier-V to I and I to V Converter-Op Amp Circuits using diodes- Sample and Hold Circuit-Log and Antilog Amplifiers-Integrator-Electronic Analog computation-Monolithic power amplifiers-Operational Transconductance Amplifier

Unit IV: **(18hrs)**

Comparators and Waveform Generators:

Introduction-Comparator-Applications of Comparator-Regenerative Comparator (Schmitt Trigger) - Sine wave Generators

Active Filters:

RC Active Filters-First Order Low Pass Filter-Second Order Active Filter-Higher Order Low Pass Filter-High Pass Active Filter-Band Pass Filter-Band Reject Filter

Unit V: **(18hrs)**

555 Timer:

Introduction-Description of Fundamental diagram-Monostable Operation-Applications in Monostable Mode- Astable operation-Applications in Astable Mode-Schmitt Trigger.

Phase-Locked Loops:

Basic Principles-Phase Detector /Comparator-Analog Phase Detector-Digital Phase Detector-Voltage Controlled Oscillator(VCO)-Low Pass Filter-PLL Applications-Frequency Multipilication/Division-Frequency Translation-FM Demodulation-Frequency Shift Keying(FSK) Demodulator

Introduction-Basic Principles-Phase Detector Comparator-Voltage Controlled Oscillator (VCO)-Low Pass Filter-Monolithic Phase-Locked Loop-PLL Applications

Text Books:

Linear Integrated Circuits- D.ROY CHOUDHURY
SHAIL B.JAIN
New Age International (P) Limited, Publishers
Reprint 2005.

Unit 1 - Chapter 1
Section (1.1-1.2, 1.4-1.9) (p.no:1-2, 4-40)

Unit 2 - Chapter 2
Section (2.1-2.3.7) (2.4.4, 2.5.1-2.5.2) (p.no:44-61, 71-83, 93-98)

Unit 3 - Chapter 4
Section (4.1-4.8, 4.13-4.14) (p.no:15 4-182, 208-217)

Unit 4 - Chapter 5
Section (5.1-5.3, 5.7) (p.no:231-240, 250-253, 289-311)
Chapter 7
Section (7.2-7.20) (p.no: 289-311)

Unit 5 - Chapter 8
Section (8.1-8.5) (p.no:335-353)
Chapter 9
Section (9.2-9.5, 9.7) (p.no:355-367,373-377)

Reference Book:

Jacob Millman and Christos C.Halkias – Integrated Electronics,
(Analog and digital circuits and systems)
Tata McGraw-Hill Publishing Company Ltd,
New Delhi, 1991, 29th reprint 2003.

Ramakant A. Gayakward - Op-Amps & Linear integrated Circuits,
Prentice Hall PTR, 2000, 4th Edition.

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN, SIVAKASI

DEPARTMENT OF PHYSICS

M.Sc. PHYSICS

SEMESTER I

CORE COURSE

HLPH1L - LAB – I

(Any 12 Experiments)

(For those admitted in June 2017 and later)

Contact hours per week : 06
Contact hours per semester : 90
Total number of credits : 04

Course Outcomes (CO):

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

CO1: recall the basic principles required for carrying out experiments.
CO2: construct electronic and non-electronic circuits.
CO3: perform experiment and collect data.
CO4: analyze the data both manually and graphically.
CO5: do the experiments by following the laboratory ethics.

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	0	0	3	0	0	1
CO2	9	3	9	3	0	0	1
CO3	9	9	9	3	0	3	1
CO4	9	9	9	3	0	3	1
CO5	0	0	0	0	0	3	1
Weightage of the course	**30**	**21**	**27**	**12**	**0**	**9**	**5**
Weighted percentage of Course contribution to POs	**5.77**	**4.02**	**6.4**	**5.5**	**0**	**25**	**7.58**

List of Experiments

1. Young's Modulus of a plate - Hyperbolic fringes.
2. Study of Susceptibility measurements of liquids – Quincke's method.
3. Ultrasonic Studies of Liquids.
4. Electrical Conductivity – Four Probe Conductivity (Energy Gap Calculation).
5. Hall Effect.
6. Dielectric Studies of Liquids.
7. Determination of numerical aperture and bending loss using Fiber Optics kit.
8. Mutual inductance between two coils for various distances by Carey Foster method.
9. Photodiode Characteristics.
10. Construction of Saw tooth Wave generator.
11. Inverting and Non- inverting amplifier using Op-amp.
12. Emitter Follower.
13. Study of active low pass filter using Op-amp.
14. Study of active high pass filter using Op-amp.
15. Clipper circuit using Op-amp.
16. Astable multivibrator using Op-amp.

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DEPARTMENT OF PHYSICS

M.Sc. PHYSICS

SEMESTER - I

ELECTIVE COURSE

HLPH1E2 - DIGITAL LOGIC DESIGN

(For those admitted in June 2017 and later)

Contact hours per week : 06
Contact hours per semester : 90
Total number of credits : 05

Course Outcomes (CO):

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

- CO1: simplify the Boolean functions and to construct circuits
- CO2: explain the working of digital circuits (combinational and sequential) with diagram
- CO3: design combinational and sequential circuits using gates and flip flops
- CO4: analyze combinational and sequential circuits using gates and flip flops
- CO5: apply the design procedure to solve problems

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	9	3	3	0	0	0
CO2	3	9	3	3	0	0	0
CO3	9	9	3	3	0	0	0
CO4	9	9	3	3	0	0	0
CO5	9	9	3	3	0	0	0
Weightage of the course	**31**	**45**	**15**	**15**	**0**	**0**	**0**
Weighted percentage of Course contribution to POs	**5.96**	**8.6**	**3.55**	**6.88**	**0**	**0**	**0**

Unit I :

Simplification of Boolean Functions: (18 hrs)

The Map Method – Two-and Three-Variable Maps – Four-Variable Map – Five- and Six-Variable Maps – Product of Sums Simplification – NAND and NOR Implementation – Other Two-Level Implementations – Don't-Care Conditions.

Unit II :

Combinational Logic : (18 hrs)

Introduction – Design Procedure – Adders – Subtractors – Code Conversion – Analysis Procedure – Multilevel NAND Circuits – Multilevel NOR Circuits – Exclusive-OR and Equivalence Functions.

Unit III :

Combinational Logic with MSI and LSI: (18 hrs)

Introduction – Binary Parallel Adder – Carry propagation-Decimal Adder – BCD adder-Magnitude Comparator – Decoders –Demultiplexers-Encoders- Multiplexers – Read-Only Memory(ROM) – Programmable Logic Array(PLA).

Unit IV :

Sequential Logic: (18 hrs)

Introduction – Flip-Flops – Triggering of Flip-Flops – Analysis of Clocked Sequential Circuits – State Reduction and Assignment – Flip-Flop Excitation Tables – Design Procedure – Design of Counters – Design with State Equations

Unit V :

Registers, Counters and the Memory Unit: (18 hrs)

Introduction – Registers –Register with parallel load-Sequential logic implementation-Shift Registers – Serial transfer-Bidirectional Shift register with parallel load-Serial addition-Ripple Counters –Binary Ripple counter-BCD Ripple counter- Synchronous Counters – Binary counter-Binary Up-Down counter-BCD counter-Timing Sequences -Johnson Counter.

Text Book :

M. Morris Mano – Digital Logic and Computer Design
Prentice-Hall of India Private Limited
New Delhi – 2003

Unit I	–	Chapter 3 – Sections 3.1 – 3.8 Page No : 72 to 102
Unit II	–	Chapter 4 Page No : 116 to 149
Unit III	–	Chapter 5 – Sections 5.1 – 5.8 Page No : 154 to 195
Unit IV	–	Chapter 6 Page No : 202 to 251
Unit V	–	Chapter 7 – Sections 7.1 – 7.6 Page No : 256 to 289

Reference Book:

S Salivahanan & S Arivazhagan - Digital Circuits and Design
Vikas Publishing House Pvt Ltd.
2nd Edition 2003
4th Reprint 2004

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN, SIVAKASI

DEPARTMENT OF PHYSICS

M.Sc. PHYSICS

SEMESTER – II

CORE COURSE

HLPH21 - QUANTUM MECHANICS - I

(For those admitted in June 2017 and later)

Contact hours per week : 06
Contact hours per semester : 90
Total number of credits : 04

Course outcomes (CO):

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

- CO1: state the properties of Schrodinger formulation and matrix formulation of quantum mechanics.
- CO2: explain Schrodinger wave equation, eigen functions, eigen values of energy and momentum, Hermite polynomial, Laguerre polynomials and equations of motion.
- CO3: apply Schrodinger wave equation to exactly solvable systems of bound state, collision problems and matrix theory to linear harmonic oscillator problem.
- CO4: interpret the significance of Ehrenfest theorem, eigen values, eigen functions, operators and delta functions.
- CO5: analyse discrete energy levels and wave functions of bound state, Hilbert space of state vectors, commutator brackets and equations of motion using matrix formulation of quantum theory

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	0	0	1	0	0	0
CO2	3	0	3	1	0	0	0
CO3	9	9	9	1	0	0	1
CO4	3	9	9	1	0	0	1
CO5	9	9	9	1	0	0	1
Weightage of the course	**25**	**27**	**30**	**5**	**0**	**0**	**3**
Weighted percentage of Course contribution to POs	**4.81**	**5.16**	**7.11**	**2.29**	**0**	**0**	**4.55**

Unit I :

The Schrödinger Wave Equation : (18hrs)

Development of the Wave Equation: Travelling harmonic waves-need for a wave equation- The one dimensional wave equation-Extension to three dimensions-Inclusion of forces-Interpretation of the wave function: Statistical interpretation- Normalisation of – Probability current density- Expectation value- Ehrenfest's theorem-Energy eigen functions: Separation of the wave equation- Significance of the separation constant E- Boundary conditions at great distances- Continuity conditions- Boundary conditions for infinite potential energy- Energy eigen values in one dimension- Discrete energy levels- continuous energy eigenvalues- Discrete and continuous eigenvalues in three dimensions.

Unit II :

Eigenfunctions and Eigenvalues: (18hrs)

Interpretative postulates and energy eigenfunctions: Dynamical variables as operators- Exapansion in eigen functions- The total-energy operator- Normalisation in a box- Orthonormality of energy eigenfunctions- Reality of energy eigen values- Exapansion in energy eigenfunctions- The closure property- Probability function and expectation value-General solution of the Schrodinger equation-Momentum Eigenfunctions: Form of the eigen functions- Box normalization- The Dirac delta function- A representation of the delta function- Normalisation in terms of the delta function- Some properties of delta function – Closure- Expansion in momentum eigenfunctions- Probability function and expectation value-Motion of a free wavepacket in one Dimension: The minimum uncertainty product- Form of the minimum packet- Momentum expansion coefficients- Change with time of a minimum packet.

Unit III :

Exactly solvable systems:-I (18hrs)

One dimensional Square well potential : Perfectly rigid walls- Finite Potential step – Energy levels- Parity-Bound states: Linear harmonic oscillator: Asymptotic behaviour- Energy levels- Zero-point energy- Hermite polynomials- Harmonic-oscillator wave function- correspondence with classical theory- Oscillating wave packet.

Unit IV:

Exactly solvable systems:-II (18hrs)

The Hydrogen atom: Reduced mass- Asymptotic behaviour- Energy levels- Laguerre polynomials- Hydrogen-atom wave function- Degeneracy- Separation in parabolic coordinates- energy levels- Wave functions – Collision Theory: One dimensional Square potential barrier: Asymptotic behaviour- Normalisation- Scattering coefficients- Scattering of a wave packet.

Unit V :

Matrix Formulation of Quantum Mechanics: (18 hrs)

Transformation Theory: Hilbert Space – Dirac's bra and ket notation – projection Operators- Physical meaning of matrix elements- Equations of Motion: Schrödinger picture – Heisenberg picture – Interaction picture - Energy representation- Classical lagrangian and Hamiltonian equations of motion- Poisson Brackets- Quantisation of a classical system- Motion of a particle in an electromagnetic field- Evaluation of commutator brackets-Velocity and acceleration of a charged particle– Matrix theory of Harmonic Oscillator : Energy representation- Raising and lowering operators - Matrices for a, x and p –Coordinate representation.

Text Books :

Leonard I. Schiff - Quantum Mechanics
McGraw Hill International Editions
Third Edition, 1968

Unit I	-	Chapter 2: Section 6,7,8 (pg. no. 19-37)
Unit II	-	Chapter 3: Section 10,11,12 (pg.no. 46-64)
Unit III	-	Chapter 2 : Section 9(pg.no.37-43)
		Chapter 4 : Section 13 (66-76)
Unit IV	-	Chapter 4 : Section 16 (88-98)
		Chapter 5 : Section 17 (pg.no.101-105)
Unit V	-	Chapter 6 : Section 23,24,25(Pg.no. 163 – 178,180-185)

Reference Books:

1. P.M Mathews and K.Venkatesan - A Text Book on Quantum Mechanics
Tata McGraw Hill Education Private Limited
New Delhi
Second Edition 2010

2. John L.Powell & Crasemann - Quantum Mechanics
Narosa Publishing House, Ninth Reprint 1998

3. Sathya Prakash - Advanced Quantum Mechanics
Kedar Nath Ram Nath Publishers, Meerut
Fifth Revised and enlarged Edition 1999

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN, SIVAKASI

DEPARTMENT OF PHYSICS

M.Sc. PHYSICS

SEMESTER – II

CORE COURSE

HLPH23 - Electromagnetic Theory

(For those admitted in June 2017 and later)

Contact hours per week : 06
Contact hours per semester : 90
Total number of credits : 04

Course Outcomes (CO):

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

- CO1: recall the basic concepts and different laws of electrostatic fields, magnetic fields, propagation of waves and Maxwell's equations.
- CO2: describe static electric and magnetic fields, their behavior in different media, associated laws, boundary conditions and electromagnetic potentials.
- CO3: apply different techniques of vector calculus to solve problems related to electromagnetic field.
- CO4: analyze the propagation of electromagnetic waves in different media and their interfaces.
- CO5: apply Maxwell's equations for electromagnetic wave propagation in different transmission lines and media.

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	3	0	0	0
CO2	3	3	3	3	0	0	0
CO3	9	3	3	3	0	0	0
CO4	9	3	3	3	0	0	0
CO5	9	3	3	3	0	0	0
Weightage of the course	**33**	**15**	**15**	**15**	**0**	**0**	**0**
Weighted percentage of Course contribution to POs	**6.35**	**2.87**	**3.55**	**6.88**	**0**	**0**	**0**

Unit I

Electrostatic Fields I : (18hrs)

Coulomb's law – The Electric Field Intensity – The Electric potential - The Electric field inside and outside macroscopic bodies – Gauss's law – The equations of Poisson and Laplace – Conductors – Calculation of electric field produced by a simple charge distribution – The electric dipole – The linear electric quadrupole – Electric multipoles – The electric field outside an arbitrary charge distribution – The average electric field intensity inside a sphere containing an arbitrary charge distribution - The potential energy of a charge distribution – Energy density in an electric field – Forces on conductors.

Electrostatic Fields II :

Electric polarization – Electric field at an exterior point

Electrostatic Fields III :

Continuity of V, D_n, E_t at the interface between two different media – The uniqueness theorem – Solution of Laplace's equation in rectangular coordinates – Solution of Poisson's equation for V- Solution of Poisson's equation for E.

Unit II

Magnetic Fields I: (18hrs)

Magnetic forces – The magnetic induction B – The Biot – Savart law – The force on a point charge moving in a magnetic field – The divergence of the magnetic induction B – The vector potential A – The curl of the magnetic Induction B – Ampere's circuital law – The magnetic dipole.

Magnetic Fields II :

The Faraday induction law – The induced electric field intensity E in terms of the vector potential A – Induced electromotance in a moving system – Inductance and induced electromotance – Energy stored in a magnetic field.

Unit III

Maxwell's Equations : (18hrs)

The conservation of electric charge – The potentials V and A – The Lorentz condition – The divergence of E and the non-homogenous wave equation for V - The non-homogenous wave equation for A - The curl of B-Maxwell's Equations – Duality – Lorentz's Lemma – The non-homogenous wave equations for E and B.

Unit IV (18hrs)

Propagation of Electromagnetic waves I :

Plane electromagnetic waves in free space – The E and H vectors in homogenous, isotropic, linear and stationary media – Propagation of plane electromagnetic waves in non-conductors - Propagation of plane electromagnetic waves in conducting media - Propagation of plane electromagnetic waves in good conductors - Propagation of plane electromagnetic waves in low – pressure ionized gases.

Unit V **(18hrs)**

Propagation of Electromagnetic waves II :

The laws of Reflection and Snell's Law of Refraction – Fresnel's Equations – Reflection and Refraction at the Interface Between Two Nonmagnetic Nonconductors – Total Reflection at an Interface Between Two nonmagnetic Nonconductors .

Propagation of Electro magnetic waves III :

Propagation in a straight line – TE and TM waves-TEM waves – Boundary conditions at the surface of metallic wave guides - The coaxial line – The hollow rectangular wave guide.

Text Book:

Paul Lorrain and Dale R. Corson - Electromagnetic Fields and Waves
CBS Publishers & Distributors (New Delhi)
II Edition, First Indian Edition 1986, Reprint 2003

Unit I - Chapter 2(Pg 40-81)
Chapter 3 : Section 3.1, 3.2(Pg 91-97)
Chapter 4 :Section 4.1,4.2,4.4,4.6, 4.7(Pg138-144,156-163,176-180)

Unit II - Chapter 7 (Pg292-323)
Chapter 8 : Section 8.1 to 8.5(Pg332-356)
Unit III - Chapter 10 (Pg 422-453)
Unit IV - Chapter 11 (Pg 459-495)
Unit V - Chapter 12: Section 12.1-12.4(Pg 504-526)
Chapter 13: Section 13.1- 13.3.1 (Pg 557-578)

Reference books :

1. John R. Reitz – Foundation of Electromagnetic theory
   Frederick J.Milford Narosa publishing house–
   Robert W.Christy III Edition -Twelfth Reprint, 1998

2. David J. Griffiths – Introduction to Electrodynamics –
   Pearson Education –
   III Edition Fourth Indian Reprint, 2004

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN, SIVAKASI
DEPARTMENT OF PHYSICS
M.Sc. PHYSICS
SEMESTER II
CORE COURSE
HLPH2L - Lab –II
(Any 12 Experiments)
(For those admitted in June 2017 and later)

Contact hours per week : 06
Contact hours per semester : 90
Total number of credits : 04

Course Outcomes (CO):
On successful completion of the course, the learners should be able to

CO1: state the principles of the experiments.
CO2: perform electronic and non-electronic experiments
CO3: calculate the physical parameters
CO4: analyse the data and draw conclusions manually and graphically
CO5: do experiments with laboratory ethics

CO-PO Mapping table (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	0	0	3	0	0	1
CO2	9	3	9	3	0	0	1
CO3	9	9	9	3	0	3	1
CO4	9	9	9	3	0	3	1
CO5	0	0	0	0	0	3	1
Weightage of the course	**30**	**21**	**27**	**12**	**0**	**9**	**5**
Weighted percentage of Course contribution to POs	**5.77**	**4.02**	**6.4**	**5.5**	**0**	**25**	**7.58**

List of Experiments:

1. Wavelength of Spectral lines using Hartmann's Interpolation Method (Arc spectrum)
2. Young's Modulus of a plate using Elliptic fringes.
3. Edser Butler fringes.
4. Wavelength of sodium light and separation between D_1 and D_2 lines of sodium light using Michelson's interferometer.
5. Ultrasonic Studies of Solids.
6. Dielectric Studies of Solids.
7. Thermal Expansion of solid using Interference method.
8. Susceptibility of solid using Guoy Balance.
9. Amplitude Modulation.
10. Characteristics studies on UJT .
11. Relaxation Oscillator using UJT.
12. Waveform Generation and Hysteresis studies using Schmitt Trigger.
13. Solving Simultaneous equations using Op Amp.
14. Solving Differential equations using Op Amp.
15. Oscillator using Op Amp
16. Sample and Hold circuit using Op-amp.