PSGR
Krishnammal College for Women

DEPARTMENT OF PHYSICS

MASTER OF PHYSICS

2022-23 BATCH

PSGR
Krishnammal College for Women

M. Sc Physics

PROGRAMME OUTCOMES

PLO1: To enhance the student's abilities, personal qualities and transferable skills which will give
them an opportunity to develop as responsible citizens.

PLO2: To understand the laws, theorems and basic concepts in physics.

PLO3: To use a systematic concept-based problem-solving approach that can be applied to different
conditions.

PLO4: To understand the physical of behavior of microscopic and macroscopic bodies.

PLO5: To pursue complex, open-ended investigation in physics.

PLO6: To understand the theories which describe the nature of physical phenomena and to establish
them by experiments.

PLO7: To enhance the computational skills and to make the students to handle software with confidence.

PROGRAM SPECIFIC OUTCOMES

At the end of the programme the student will

- Be able to play an important role in the development of scientific technology.
- Gain expertise in using scientific equipment.
- Be able to carry out scientific projects.
- Be able to apply renewable energy.
- Be able to apply mathematical theory to physical systems.
- Secure jobs in research laboratories and medical institutions.
- Gain admission in research courses.
- Be able to make effective use of information technology.

PSGR Krishnammal College for Women

DEPARTMENT OF PHYSICS
CHOICE BASED CREDIT SYSTEM & OUTCOME BASED EDUCATION

Programme & Branch MSc Physics

Scheme of Examination
(Applicable to students admitted during the academic year2022-2023 onwards)

Semester	Subject code	Title of the paper	Instructions Hours/week	Duration of exam in hours	Maximum marks			credits
					CA	ESE	Total	
I	MPS2201	Paper I- Mathematical Physics –I	6	3	50	50	100	4
	MPS2202	Paper II - Classical Mechanics	6	3	50	50	100	4
	MPS2203	Paper III - Thermodynamics & Statistical Mechanics	6	3	50	50	100	4
	MPS2204	Paper IV – Electronics	6	3	50	50	100	4
	MPS21P1	Practical-I General Practicals	3	.....	…..	…..	……	….
	MPS21P2	Practical –II Electronics Practicals	3	.....	……	…..	…..	…..

MPS2201	MATHEMATICAL PHYSICS - I	Category	L	T	P	Credit
			86	6	-	4

Preamble

The aim of this course is to provide the mathematical foundation in vectors, matrices, Complex numbers and special functions required for the description of the physical phenomena.

Prerequisite

- Basic idea on vectors, matrices , complex numbers, Partial Differential Equations , Special Functions

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO 1	Understand the basic principles of mathematical physics and its applications	K2
CLO 2	Analyse the nature of the problems in physics	K3
CLO 3	To improve their logical, mathematical and analytical skills in problem solving	K4
CLO 4	Formulate, interpret and draw inferences from mathematical solutions	K5
CLO 5	Develop expertise in mathematical techniques required in physics	K6

Mapping with Programme Outcomes

COs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO 1	S	S	S	S	M	S	M
CLO 2	S	S	S	S	S	M	S
CLO 3	S	S	S	S	S	M	M
CLO 4	S	S	S	M	S	M	M
CLO 5	S	S	S	S	S	S	S

S- Strong; M-Medium; L-Low

Syllabus

Unit I – Vectors **17 Hrs**

Gauss divergence theorem[1] & its physical interpretation - Gauss's Theorem – Stokes's theorem-Poisson's equations – curvilinear coordinates – orthogonal curvilinear coordinates – condition for orthogonality – **cylindrical coordinates**[2] – spherical polar coordinates. linear vector space, linear independence of vectors and dimensions, basis and expansion theorem, inner product and unitary spaces, Orthonormal sets, Schmidt's orthogonalisation method.

Unit II – Matrices **17 Hrs**

Review of algebraic operations of matrices, sub matrices[3], partitioning of matrices, **special types of matrices and their properties**, **vectors as matrices**[4] and vector spaces, linear transformations, orthogonal and unitary transformation, eigen values, eigen vectors, Cayley Hamilton theorem, **Stochastic matrices, diagonalisation of matrices**, **power of a matrix**, **exponential of a matrix**[5]. Matrices in physics: rotation matrix, Pauli's spins matrices, Dirac matrices.

Unit III – Complex Variables **17 Hrs**

Introduction, **regular functions, elementary functions and mapping,** contour integration, Cauchy's theorem, Cauchy's integral formula, Results based on contour formula, **Taylor's expansion**[7], Laurent's expansion, Residue and contour integration, Cauchy's residue theorem, integration round the unit circle, evaluation of definite integrals - $\sin\theta$ and $\cos\theta$.

Unit IV – Partial Differential Equations **17 Hrs**

Laplace equation, Poisson's equation, Heat flow equation, Wave equation, Helmholtz equation, Solution of Laplace equation in Cartesian co-ordinates, in two dimensional cylindrical co-ordinates, in two dimensional spherical polar co-ordinates, Solution of Poisson equation, **Diffusion equation or equation of heat flow. Solution of heat flow equation in one dimension**[8,9]**.**

Unit V – Special Functions **18 Hrs**

Series solution, **solution of Linear differential equation of first order**[10], solution of second order linear differential equation with constant coefficients, power series solution-Frobenius' method, Legendre's equation, Legendre's function of I and II kind, Generating function of Legendre polynomial, Recurrence formula for $P_n(x)$, Bessel's function of I kind, recurrence function for $J_n(x)$, generating function for $J_n(x)$, Hermite differential equation, **Hermite polynomial, recurrence for Hermite polynomial**[11]**.**

Text Book

S. No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	Sathya Prakash	Mathematical Physics with Classical mechanics	Sultan Chand & Sons	2014	6thEdition

Reference Books

S. No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	ChattopadhayP.K	Mathematical physics	New Age International-New Delhi	2004	1st Edition.
2	Dass.H.K,	Mathematical Physics	S. Chand and Company Pvt. Ltd,	2014	7th Edition.
3	Erwin Kreyzig	Advanced Engineering Mathematics	Wiley India Private Limited,	2011	10thEdition.
4	Joshi A.W	Matrices and Tensors in Physics	Wiley Eastern Ltd,	2005	4th edition
5	Pipes & Harvill	Applied Mathematics for Engineers and Physicists	McGraw Hill international Book company	2014	3rd Edition.
6	Hans. J Weber and George. B.Arfken	Mathematical methods for Physicists	Academic Press	2011	7th Edition.

Pedagogy

Chalk and Talk lectures, Group Discussion, Seminar, Interaction, power point presentation, E-content link

Course Designers:

1.Mrs.S.Subanya
2. Mrs.D.Niveditha

E-Content link

1. https://www.youtube.com/watch?v=vZGvgru4TwE
2. https://www.youtube.com/watch?v=CrafR-XZubw
3. https://www.youtube.com/watch?v=MqmYlQ9zxvw
4. https://study.com/academy/lesson/types-of-matrices-definition-differences.html
5. https://www.youtube.com/watch?v=LTb9V84hG9w
6. https://www.youtube.com/watch?v=NtM7qFcML
7. https://www.youtube.com/watch?v=3d6DsjIBzJ4
8. https://www.youtube.com/watch?v=1X2MJH_MUgU
9. https://www.youtube.com/watch?v=ky4J7btqfXI
10. https://www.youtube.com/watch?v=2G0nihWWG8Y
11. https://www.youtube.com/watch?v=5UEWlnZbbLQ

MPS2202	CLASSICAL MECHANICS	Category	L	T	P	Credit
			86	6	-	4

Preamble

The aim of this course is to provide an in-depth knowledge of the principles of classical mechanics and the study of specific problems, viz. the two body central force problem and small oscillations.

Prerequisite

- Basic knowledge on differential calculus and Newtonian Mechanics
- Knowledge on rotational dynamics

Course Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Study the applications of Newtonian mechanics in daily life	K2
CLO2	Understand the motion of bodies, including the special case in which bodies remain at rest in accordance with the Newtonian principles	K3
CLO3	Analyze the movement of macroscopic objects, like projectiles, and astronomical objects, such as spacecraft, planets, stars, and galaxies.	K4
CLO4	Develop knowledge of the behaviour of bodies under the influence of forces	K5
CLO5	Develop familiarity with the physical concepts and facilitate with the mathematical methods of classical mechanics	K6

Mapping with Programme Outcomes

CLOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CLO1	S	S	M	M	M	L	L
CLO2	S	M	S	M	M	L	L
CLO3	S	M	M	L	M	L	L
CLO4	S	M	M	M	M	S	L
CLO5	S	M	M	S	M	M	L

S- Strong; M-Medium; L-Low

Syllabus

Unit I: Fundamental principles of Lagrangian Formulation 16hrs

Mechanics of a particle- Mechanics of a system of particles- constraints- D'Alembert's principle and Lagrange's equations- Velocity – dependent potentials and the dissipation function- **simple application of the Lagrangian formulation[1]**-Single particle in space-**Atwood's machine[2,3]-bead sliding on a rotating wire[3,4]**, linear harmonic oscillator- **simple pendulum[5]**.

Unit II: Variational principles andLagrange's equations: **17 hrs**

Hamilton's principle- some techniques of the calculus of variations- derivation of Lagrange's equations from Hamilton's Principle- Extension of Hamilton's principle to non holonomic systems- **Advantages of a variational principle formulation[6]** - conservation theorems and symmetry properties-Energy function and the conservation of energy.

Unit III: Two body central force problem 17 hrs

Reduction to the equivalent one-body problem- the equations of motion and first integrals-the equivalent one- dimensional problem and classification of orbits- law potentials- conditions for closed orbits (Bertrand's theorem) - **the Kepler problem: inverse square law of force[7]- the motion in time in the Kepler problem[7]**- The Laplace-Runge-Lenz vector-Scattering in a central force field- **transformation of the scattering problem to laboratory coordinates[8].**

Unit IV: Small oscillations 17 hrs

Formulation of the problem - Eigen value equation and the principle axis transformation-frequencies of free vibrations- normal coordinates- **Free vibrations of a linear tri atomic molecule[9] - Forced vibration and the effect of dissipative forces[10].**

Unit V: Hamilton's Formulation 18 hrs

Legendre transformations and the Hamilton canonical equations of motion –**Cyclic coordinates[11,12]** - Routh's procedure- Hamiltonian formulation of relativistic mechanics-**Derivation of Hamilton's equations from a variational principle[13]**- The principle of least action.

Poisson Brackets-definition-**invariance of Poisson- brackets with respect to canonical transformation[14]** –Equations of motion in Poisson bracket form-**Jacobi's identity[14]**-infinitesimal contact transformations-interpretation in terms of Poisson brackets-The angular momentum and Poisson brackets.

Text Book

S. No	Authors	Title of the Book	Publishers	Yearof Publication	Edition
1.	Herbert Goldstein	Classical Mechanics	Narosa Publishing House	2001	2nd Edition
2.	Gupta, Kumar & Sharma	Classical Mechanics	PragatiPrakashan	2012	26th reprint

3.	. R G Takwale& P S Puranik	Classical Mechanics	Tata McGraw Hill Education Pvt. Ltd,	2010	2nd Edition

Reference Books

S.No	**Authors**	**Title of the Book**	**Publishers**	**Yearof Publication**	**Edition**
1.	Rana&Joag	Classical Mechanics	TMH	2010	6th edition
2.	Douglas Gregory	Classical Mechanics	Cambridge Unversity press	2008	1stedition

Predagogy

Chalk and Talk lectures, Group Discussion, Seminar, Interaction, power point presentation

Course Designers:

1.Dr.B.Punithaveni

References For E-Content:

1. https://youtu.be/3iyDyoKZnrc
2. https://youtu.be/VwOrZ-jDqHY
3. https://youtu.be/OLJrY0v0yPI
4. https://youtu.be/PNnT9e7aTqc
5. https://youtu.be/vJ2pyd_Ag3k
6. https://youtu.be/tN_dNwQmLqU
7. https://slideplayer.com/slide/6379146/
8. https://youtu.be/0C1cbjA0HmU
9. https://youtu.be/CLKhkxaMURQ
10. https://youtu.be/nuZo8KYiWoo
11. https://youtu.be/m7XD44oG1b4
12. https://youtu.be/mQSWuwuwPxI

MPS2203	THERMODYNAMICS AND STATISTICAL MECHANICS	Category	L	T	P	Credit
			86	4	-	4

Preamble

To acquire a sound understanding of the basic principles of statistical mechanics and its application to realistic problems

Prerequisite

- An idea on thermodynamical variables, quantum and classical statistics

Course Outcomes

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

CLO Number	CLO Statement	Knowldge Level
CLO1	Learn relationship between equilibrium distributions and kinetic processes leading to equilibrium	K2
CLO2	Apply classical and quantum distributions in circumstances varying from standard examples to real statistical problems	K3
CLO3	Become aware of the richness and complexity of statistical behaviour exhibited by interacting systems and various approaches (phenomenological and microscopic) developed to comprehend such systems	K4
CLO4	Examine appropriate limiting behaviours in various statistical systems and to develop statistical description of system	K5
CLO5	Construct a partition function for a system in thermal equilibrium and use it to obtain thermodynamic quantities of interest.	K6

Mapping with Programme Outcomes

CLOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CLO1	S	S	S	S	S	M	S
CLO2	S	S	S	M	S	S	S
CLO3	S	S	S	L	S	S	L
CLO4	S	S	M	S	S	S	L
CLO5	S	S	S	S	S	L	S

S- Strong; M-Medium; L-Low

Syllabus

Unit – I: Thermodynamics **18 hrs**

Thermodynamic variables[1]- extensive and intensive variables- **Zeroth law of thermodynamics**[2] - equivalence of heat and work - **first law of thermodynamics**[3,4] - Significance of the first law of thermodynamics - thermodynamic processes - reversible process

– irreversible process - state variables and process variables - **definition of entropy[5] - second law of thermodynamics[6,7]** - entropy changes in irreversible processes - Maxwell's Thermodynamical relations - thermodynamic potentials – **Enthalpy[8],** Helmholtz and the Gibbs functions- Phase transitions – Clausius - Clapeyron equation – van der waals equation of state.

Unit- II: Classical Statistics - I **17 hrs**

Macroscopic and microscopic states[9] - phase space - Volume in phase space - postulate of equal a priori probability - density distribution in phase space - Liouville's theorem, Maxwell-Boltzmann distribution law - **micro-canonical ensemble[10, 11] - canonical ensemble[10, 11]**- calculation of mean values and fluctuations in a canonical ensemble - fluctuation dissipation relation - energy fluctuations and heat capacity - Grand-canonical ensemble - fluctuations in number of particles.

Unit – III: Classical Statistics - II **17 hrs**

Classical partition functions and their properties - Calculations of thermodynamic quantities - Chemical potential - Ideal mono atomic gas - entropy of mixing - Gibbs paradox – Equipartition theorem and its simple applications.i) Mean kinetic energy of a molecule in a gas ii) **Brownian motion[12]** iii) **Harmonic Oscillator[13]** iv) Specific heat of solid. Maxwell velocity distribution, Doppler Broadening of Spectral lines**.**

Unit – IV: Quantum Statistical Mechanics – I **17 hrs**

Ideal Bose systems

Symmetric and antisymmetric wavefunctions – The density matrix - **Quantum harmonic oscillator[14]** - Einstein's theory of heat capacity - Debye's theory of heat capacity - Bose – Einstein statistics - **black body radiation[15]**- photon gas - Planck's law - Bose-Einstein Condensation - lambda transition – Liquid helium – **Super fluidity[16,17]**

Unit-V: Quantum Statistical Mechanics - II **17 hrs**

Fermi-Dirac statistics[18] - Fermi distribution[18] - Fermi energy[18] - Mean energy of Fermions at absolute zero - Fermi energy as a function of temperature - electrons in metals - Electronic specific heat - **White Dwarfs[19]**- Compressibility of Fermi gas - Pauli's para magnetism - A relativistic degenerate electron gas.

Text Books

S. No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	Gupta Kumar	Elementary Statistical Mechanics	Pragati Prakashan	2011	24th edition
2	Kerson Huang	Introduction to Statistical Physics	Taylor & Francis	2001	Indian Edition
3	B.B. Laud	Fundamentals of Statistical Mechanics	New age International Publishers	2011	1st edition

Reference Books

S. No	Authors	Title of the Book	Publishers	Year of Publication	Edition
1	K. Huang	Statistical Mechanics	John Wiley & Sons	2009	2nd edition
2	L. D. Landau and E. M. Lifshitz	Statistical Physics	Pergamon Press	2011	3rd edition
3	R.K.Pathria& Paul D. Beale	Statistical Mechanics	Elsevier-Butterworth Heinemann	2011	3rd edition
4	F.Reif	Statistical Physics	Tata McGraw	2008	Special Indian Edition
5	Satya Prakash	Statistical Mechanics	Kedar Nath Ram Nath Publications	2011	Special Edition

Pedagogy

Chalk and Talk, ppt, group discussion, seminar, Interaction, problem solving

Course Designers:

1. Dr.N.Priyadharsini

References For E-Content:

1. https://youtu.be/fTQslkc7f4g
2. https://youtu.be/-42JmVBdlM4
3. https://youtu.be/1OFlW8OXN64
4. https://youtu.be/dHdlH3l8FkM
5. https://youtu.be/870y6GUKbwc
6. https://youtu.be/y6pGjfi8FZw
7. https://youtu.be/mGDJO2M7RBg
8. https://youtu.be/x_pbr5RFhVc
9. https://youtu.be/F_NmS-Wy2lE
10. https://youtu.be/VIVGP_IskQg
11. https://youtu.be/8ttrMYZWNXc
12. https://youtu.be/V7VtOa8pHno
13. https://youtu.be/py3EWLKQaMs
14. https://youtu.be/yG_Ot9rsNaw
15. https://youtu.be/Na-mFjyP8eU
16. https://youtu.be/2Z6UJbwxBZI
17. https://youtu.be/dLcwmMGCfU8
18. https://youtu.be/Ww9wcs3yNWI
19. https://youtu.be/ITD8s-bLXSk

MPS2204	ELECTRONICS	Category	L	T	P	Credit
			86	4	-	4

Preamble

This course deals with semiconductor device characteristics, Op-Amp characteristics and their applications & digital principles

Prerequisite

- Basic idea on semiconductor devices
- Concepts of amplifiers and oscillators

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the concepts of semiconductor devices.	K2
CLO2	Design counters and to explain power devices and their application in various fields	K3
CLO3	apply the concepts of operational amplifier to solve differential and simultaneous equations.	K4
CLO4	Solve problem related to semiconductor devices and oscillator circuit Familiarize the conversion of data from Analog to Digital and Digital to Analog	K5
CLO5	Take projects in electronics relevant to industrial and R &D needs	K6

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	S	S	S	L	L	M	L
CLO2	S	S	M	S	M	M	M
CLO3	S	S	S	M	L	M	M
CLO4	S	S	S	M	L	M	M
CLO5	S	S	S	M	S	S	M

S- Strong; M-Medium; L-Low

Syllabus

Unit I : Electronic Circuits and Devices I: 18 hrs

Tunnel Diode- Structure-Characteristics- **applications[1]** - IMPATT- PNPN diodes characteristics & **applications[2]** – Gunn diode- device operation-negative differential resistance, SCR-characteristics & **applications[3]**, Silicon Controlled Switch(SCS) – UJT structure & characteristics - UJT Oscillator - **Applications of UJT[4]**.

Optoelectronics: Photo Resistor-Photo Diode - Photo Transistor, LEDs- Device structure and **Working principle[5].**

Unit II: Electronic Circuits and Devices II: 17 hrs

The junction field effect transistor- **the pinch off voltage[6]** (Vp)-the JFET volt-ampere characteristics- Biasing the FET- FET as a Voltage Variable Resistor - the FET small signal model- the common source Amplifier at low & High Frequencies - common Drain amplifier at low & High Frequencies - MOS structure and principle of operation – **current voltage characteristics[7]**. Logic gates using MOSFETs – Complementary MOSFETs.

Unit III : Operational Amplifier: 17hrs

The operational amplifier - parameters of op amps, Frequency Response of an amplifier**, the comparator[8]**, Basic Operational Amplifier applications-Differential DC amplifier- integrator and differentiator-Electronic analog Computation solving Simultaneous and Differential equations- **log and Exponential amplifiers[9].**

Unit IV : Oscillators and Data Converters 17hrs

Wave Form Generators and Wave Shaping Circuits using Op amps – Phase Shift-Oscillator-Wien Bridge Oscillator-Crystal Oscillator- Multivibrators- Schmitt Trigger-Triangular Wave Generators – Pulse Generators - the weighted resistor D/A convertor- The R-2R ladder D/A converter – **Switches for D/A converters[10]- Inverted ladder D/A converter[11]-** A/D converters- A counter type- successive Approximation converters. IC 555 Timer and its **Applications[12].**

Unit V : Registers and Counters 17hrs

The shift register, Serial in –Serial out, Serial in – Parallel out, **Parallel in – Serial out[13]**, Parallel in – Parallel out – Counters, methods to improve counter speed,- Mod-3 counters, Mod 5, Mod 7, Mod 9 and **decade counters[14]**, Ripple counter, the up-down ripple counter, the up-down synchronous counter, ring counters, **sequence generator[15]**.

Text Books

S.No.	Author	Title of the book	Publisher	Year of Publication	Edition
1	Jacob Millman & Arvin Grabel	Microelectronics	Tata McGraw Hill Publishing Company Ltd-New Delhi	1999	2nd edition
2	Jacob Millman & Christos C Halkias	Integrated Electronics	Tata McGraw Hill Publishing Company Ltd-New Delhi	2005	41st Reprint
3	Malvino Leach	Digital Principles and Applications	Tata McGraw Hill Publishing Company Ltd-New Delhi	1995	5th Edition

4	Ramakant A.Gayakwad	Opamps and Linear Integrated Circuits	PHI Learning Pvt.Ltd,New Delhi	2000	4th Edition.
5	Sze .S.M,	Semiconductor devices Physics and Technology	Wiley Student Edition	2012	2nd Edition
6	V Vijayendran	Introduction to Integrated Electronics (Digital and Analog)	Viswanathan (Printers and Publishers) Pvt.Ltd,	2011Reprint	

Reference books

S.No.	Author	Title of the book	Publisher	Year of Publication	Edition
1	MehtaV.K & Rohit Mehta	Principles of Electronics,	Tata McGraw Hill Publishing Company Limited New Delhi	2014	11th edition
2	Gupta & Kumar,	Hand Book of Electronics,	Pragati Prakashan	2010	32nd
3	Chatterji B.N	Digital Computer technology	Khanna Publishers Delhi	1986	2nd Edition

Pedagogy

Chalk and Talk, Group Discussion, Demonstration, Problem solving, Seminar, Designing circuits, PPT and Assignment

Course Designers:

1. Dr.G.Vanitha
2. Mrs.T.Poongodi

References For E-Content:

1. https://youtu.be/PuG8CCUbg58
2. https://youtu.be/Miu22EkyXyQ
3. https://youtu.be/8OgHY4-gcQw
4. https://youtu.be/ZOOUofPeSYY
5. https://youtu.be/NUR9tebFDRc

6. https://youtu.be/paK2Tjxuog0
7. https://youtu.be/-o39YVNMYVs
8. https://youtu.be/66Jl4YmpAMY
9. https://youtu.be/-qs3qJz6dTU
10. https://youtu.be/gsF6GVz9wV0
11. https://youtu.be/gcRBw--n9yw
12. https://youtu.be/7LmBcGiiYwk
13. https://youtu.be/TqHme0lvvCU
14. https://youtu.be/fKVZpupyP_o
15. https://youtu.be/XNAK-L7NlOM

MPS21P1	PRACTICAL I - GENERAL PRACTICALS	Category	L	T	P	Credit
			-	-	4	4

Preamble

The aim of this course is to make the students gain a practical knowledge in the basics of Physics.

Prerequisite

- Basic experience in handling devices/instruments (UG level)

Course Outcomes

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

CLO Number	CO Statement	Knowledge Level
CLO1	Understand the basics of experimental physics	K2
CLO2	Explore the concepts involved in the thermodynamics, heat and modern optics	K3
CLO3	Acquire strong laboratory skills	K4
CLO4	Enhance the skill to meet the present day requirements in industries, research fields	K5
CLO5	Create the knowledge of theories involved in physics using practical experiments	K6

Mapping with Programme Outcomes

CLOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CLO1	S	M	M	S	M	M	M
CLO2	S	M	S	M	M	S	S
CLO3	S	S	M	M	S	M	M
CLO4	S	M	M	M	M	M	M
CLO5	S	M	M	M	M	S	S

S- Strong; M-Medium; L-Low

Syllabus

PRACTICAL I - GENERAL PHYSICS
(Examination at the end of Second Semester)
Any Twelve Experiments

1. Young's Modulus-Elliptical Fringes
2. Young's Modulus-Hyperbolic Fringes
3. Viscosity of a Liquid-Mayer's Oscillating Disc
4. Determination of
   (i) Refractive Index of transparent solids and liquids using Laser source
   (ii) Particle size (iii) Diffraction at a circular aperture (pin hole)
5. Study of characteristics of Laser
   (i) Determination of Gaussian nature of laser source and evaluation of beam spot size.
   (ii) Measurement of Laser beam divergence (iii) Absorption of light on various filters
6. Electronic Specific Charge - 'e/m' by Thomson's Method
7. Thermistor -Temperature Coefficient and Band Gap Energy
8. Magnetic Hysteresis loop tracing
9. Study of characteristics of optical fibre –

(i) Numerical aperture (ii) bending losses (iii) splice losses (iv) attenuation by fibre cut –Back method

10. Determination of Curie Temperature of Ferro electric solid
11. Characteristic study of Photo Transistor, photodiode and photovoltaic cell (solar cell)
12. Rydberg's constant – Solar/Hydrogen spectrum
13. Thickness of Wire by Air Wedge Diffraction
14. Determination of dipole moment of a liquid
15. Identification of prominent lines – Copper arc
16. Characteristic study of LED, LDR and Opto coupler.
17. Determination of reverse saturation current and material constant– p-n junction apparatus

Course Designers:

1. Dr. N.Priyadharsini

MPS21P2	PRACTICAL II-ELECTRONICS PRACTICALS	Category	L	T	P	Credit
			-	-	4	4

Preamble

The aim of this course is to make the students to practically learn the characteristics of different electronic circuits.

Prerequisites

- Basic experience in constructing and handling electronic circuits (UG level)

Course Outcomes

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

CLO Number	CO Statement	Knowledge Level
CLO1	Understand the basic concepts in IC's, digital devices and C programming.	K2
CLO2	Apply circuit systems to construct electronic devices	K3
CLO3	Evaluate the functioning of circuits	K4
CLO4	Enhance the skill to meet the present day requirements in industries, research fields.,	K5
CLO5	Become proficient to be directly employed or start his/her own work as Electronic circuit Designer	K6

Mapping with Programme Outcomes

CLO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CLO1	S	M	M	S	M	M	M
CLO2	S	M	S	M	S	M	S
CLO3	S	S	M	M	M	M	S
CLO4	S	M	M	M	M	M	M
CLO5	S	M	M	M	M	M	S

S- Strong; M-Medium; L-Low

Syllabus

PRACTICAL II-ELECTRONICS PRACTICALS
(Examination at the end of second Semester)
Any Twelve Experiments

1. Design of Regulated and Dual Power Supply and Construction using fixed voltage regulator and 723.
2. Characteristics of UJT
3. UJT Relaxation Oscillator
4. FET –common source amplifier
5. FET –common drain amplifier
6. Op-Amp parameters
7. Wave Form Generators- using Op-Amp and Timer 555.
8. (i) Phase-Shift Oscillator (ii) Wien's Bridge Oscillator using Op-Amp
9. Op-Amp – log and antilog amplifier
10. Sign Changer, Scale Changer, Summer and Subtractor- Op-Amp
11. Analog Computer Setup-Solving Simultaneous Equations
12. Schmitt Trigger using discrete components and OP-AMP/ Timer 555

By Simulation and using ICs

13. Flip-Flops (RS, JK , D)
14. Counters- Digital ICs
15. Shift register- Digital ICs
16. (i) Write a C program to calculate the De Broglie's wave length $\left(\lambda = \frac{h}{p}\right)$

    (ii) Write a C program to prove Heisenberg's Uncertainty Principle
17. Write a C program to find the solution for the ground state of hydrogen atom
18. Write a C program to integrate a given function using Simpsons Rule.
19. Write a C program to study the Motion of a particle under the force f(x) = -x
20. Write a C program to calculate the bond length of NaCl

Course Designers:

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