GOVT.DIGVIJAY AUTO. P.G. COLLEGE

UGC
University Grants Commission

RAJNANDGAON (C.G.)

UGC
University Grants Commission

SESSION 2024-2025

DEPARTMENT OF PHYSICS

1.Add-on Course (EEM)
2.M.Sc. Previous
3.M.Sc. Final

ELECTRONICS EQUIPMENT MAINTENANCE

Add-on Course – EEM
Eligibility For B.Sc. Students along with B.Sc. Part – III
Third Year :- Advanced Diploma Course(2024-2025)

OBJECTIVES

The benefits of career-oriented course can be extended to regular students. Education Plays very vital in each and every person's life. The aim of college is to bring the quality education to the student in every aspect of life with view and looking at the future and of the EEM.

Detail of the Add-on course (Certificate/Diploma/Advance Diploma)

1. The course will be 20 credits is equal to 200 marks.
2. Paper - 1 will be 75 marks = 6 credits.
3. Paper – 2 will be 75 marks = 6 credits.
4. Field work/Project work / Training/Practical & Viva will be 50 marks = 8 credits.
5. Field work & Training on EEM will be 10 marks.
6. Project work will be 10 marks.
7. Practical work will be 25 marks.
8. Viva will be 5 marks.
9. Each credit will have 15 hrs. of workload out of which 8 credits should be field work/Project work/Training/Practical & Viva on EEM.
10. Each Theory Paper will be 6 credits i.e. 2*6=12 credits for 2 papers.
11. Each credits will be 1.2 credits.
12. Each credit will have 15 hrs. of workload.
13. 8 credits will be fieldwork/project work/training/Practical i.e. 8*15 hrs. = 120 hrs.
14. Paper – 1 & Paper – 2 will be 90 Hrs. for each paper i.e. each unit is = 90/5 = 18 hrs.

ELECTRONICS EQUIPMENT MAINTENANCE

Add-on Course – EEM

Eligibility For B.Sc. Students along with B.Sc. Part – III

Third Year :- Advanced Diploma Course(2024-2025) **M.M. - 75**

PAPER – I
Antenna and Television

UNIT – 1

Antenna, indoor antenna, Outdoor antenna, Disc antenna, Commercial disc programming, Yogi antenna, booster, booster amplifier, booster power supply, their clot circuit servicing of booster.

UNIT – 2

Element of the television system, Picture Transmission, Sound Transmission, picture reception, sound reception, video signal, scanning sequence, sync 625 line system, HDTV, 1250 line system aspect ratio channel band width vestigial side band transmission.

UNIT – 3

B/W television type tuner mechanical and electronics VIF section, vide detector, SIF section, audio output, video output, detection process, EHT section, power supply ckt, AGC, AFC. Repair and Trouble shooting.

UNIT – 4

Colour system primary and secondary colours, colour transmission, colour composition, video signal sync pulse, band for colour TV, television standard (PAL, NTN, SECOM)
Picture tubes – monochrome, charging colour picture tube charging.

UNIT – 5

Colour Television – Type, Tuner, Electronic System, control remote controls, transmission and receiver, VIF & SIF section video processor detection processing EHT power supply AC-C, AVC, AFC, ACC, ABC etc. trouble shooting.

Reference

1. **Computer communication D. C. jain**
2. **Hand Book of electronics Guptakumar**

- H.O.D. - 20/5/2024
- BY V.C. Nominated -.....
- Subject Expert - 1..... 20/5/24 2.....
- Faculty members – 1..... 2..... 20/5/24
- Industrialist-.....
- Alumni- .....

ELECTRONICS EQUIPMENT MAINTENANCE

Add-on Course – EEM

Eligibility For B.Sc. Students along with B.Sc. Part – III

Third Year: - Advanced Diploma Course(2024-2025) **M.M. - 75**

PAPER – II

Compact Disk, Telephone, Mobile

UNIT – 1

CD & DVD – Compact Disk construction CD mechanisms, Three motors, motor drive, servo and mechanical operation, open hold, play FF, RFW, Pick-up unit, Lenses, Laser, Basic Operation, Block Diagram, Wiring Connection, Common Trouble Shooting.

UNIT – 2

Telephones – modulations, demodulations, subscriber, frequency, allotment, switching exchanges, STD,ISD, EPABX. Intercom equipment, Fax, E-mails.

UNIT – 3

Measuring instrument- multi meter, analog/digital oscilloscope, signal, signal generators, noise and sound level meters, and frequency counter over power precaution during measurement.

UNIT – 4

Mobile Phones – Menu Functions, mobile basic function, SIM Card, Battery Charger, Battery block Diagram of mobile phones, Cordless wireless basic knowledge of mobile Software and Software function, LCD display, water damages, basic trouble shooting.

UNIT – 5

Programming the microprocessor, machine and assembling, arithmetic and logical operation, data transfer operation, inter facing the microprocessor, interfacing with ROM, inter facing with RAM, Introduction with Practical I/O ports, Programming the 8085-Processor introduction.

Reference

1. **Microprocessor architecture, programming applications with 8085/8086 by Ramesh S. Gaonkar, Willey-Eastem limited 1987.**
2. **Introduction to microprocessors-A.P. Mathur (Tata Mcgraw).**
3. **Microprocessor: B Ram**
4. **Electronic Subirkumar Sarkar**
5. **Satellite communication D. C Agrawal**

- H.O.D. - .....
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ELECTRONICS EQUIPMENT MAINTENANCE

Add-on Course – EEM

Eligibility For B.Sc. Students along with B.Sc. Part – III

Third Year: - Advanced Diploma Course (2024-2025)

Detail of the Practical/Fieldwork/Project Work/Viva Total marks = 50 (08 credits)

1. Practical marks will be 25 marks.
2. Field works & Training on EEM will be 10 marks.
3. Project work will be 10 marks.
4. Viva will be 5 marks.

List of Practical :-

1. Analog to Digital
2. Digital to Analog
3. Microprocessor
4. Antenna
5. Color Television Troubleshooting
6. B/W T.W
7. Mobile Basic Troubleshooting
8. Telephones
9. Various Power Supply

- H.O.D. - .....
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M.Sc. PHYSICS – SEMESTER EXAMINATION

SESSION2024-2025

CREDIT BASED SYSTEM

At post-graduate level, candidates are required to study sixteen theory papers in Ist, IInd, IIIrd, and IVthSemester Examination (4 Theory papers and 2 Practical's in each semester). This is treated as 16 Theory papers and 8 Practical course structure. So there will be 16 Theory papers and 8 Practical in each POST-GRADUATE EXAMINATION in PHYSICS containing 80 credits. In Ist, IInd, IIIrd, and IVthSemester Exam, each paper shall carry 100 marks 80 marks for external examination and 20 marks for internal examination). In each Semester two practical's, each carries 100 marks and altogether 8 practical (each 100 marks). There is 2400 marks in M.Sc. Candidates should secure 36 percent marks in aggregate of all papers in order to pass the M.Sc. Examination.

M.Sc. SEMESTER- I

PAPER	TITLE OF THE PAPER	COURSE CODE	CREDITS	THEORY	INTERNAL	TOTAL
I	MATHEMATICAL PHYSICS	PPHCT101	04	80	20	100
II	CLASSICAL MECHANICS	PPHCT102	04	80	20	100
III	ELECTRODYNAMICSAND PLASMA PHYSICS	PPHCT103	04	80	20	100
IV	ELECTRONICS ANDPHOTONICS DEVICES AND OPTICAL MODULATION	PPHCT104	04	80	20	100
Prac I	LAB COURSE-I	PPHCL105	02	100	-	100
Prac II	LAB COURSE-II	PPHCL106	02	100	-	100
Total			20	-	-	600

M.Sc. SEMESTER- II

PAPER	TITLE OF THE PAPER	COURSE CODE	CREDITS	THEORY	INTERNAL	TOTAL
I	QUANTAM MECHANICS -I	PPHCT201	04	80	20	100
II	STATISTICAL MECHANICS	PPHCT202	04	80	20	100
III	ELECTRONICS –I	PPHCT203	04	80	20	100
IV	COMPUTATIONAL PHYSICS AND PROGRAMMING	PPHCT204	04	80	20	100
Prac I	LAB COURSE- III	PPHCL205	02	100	-	100
Prac II	LAB COURSE-IV	PPHCL206	02	100	-	100
Total			20	-	-	600

M.Sc. SEMESTER- III

PAPER	TITLE OF THE PAPER	COURSE CODE	CREDITS	THEORY	INTERNAL	TOTAL
I	QUANTAM MECHANICS -II	PPHCT301	04	80	20	100
II	ATOMIC ANDMOLECULAR PHYSICS	PPHCT302	04	80	20	100
III	SOLID STATEPHYSICS -I	PPHCT303	04	80	20	100
IV	ELECTRONICS-II	PPHET304	04	80	20	100
Prac I	LAB COURSE-V	PPHCL306	02	100	-	100
Prac II	LAB COURSE-VI	PPHCL307	02	100	-	100
Total			20	-	-	600

M.Sc. SEMESTER- IV

PAPER	TITLE OF THE PAPER	COURSE CODE	CREDITS	THEORY	INTERNAL	TOTAL
I	NUCLEAR ANDPARTICLE PHYSICS	PPHCT401	04	80	20	100
II	LASER PHYSICSAND APPLICATION	PPHCT402	04	80	20	100
III	SOLID STATEPHYSICS -II	PPHCT403	04	80	20	100
IV	ELECTRONICS -III	PPHET404	04	80	20	100
Prac I	LAB COURSE-VII (INSTRUMENTATION)	PPHCL406	02	100	-	100
Prac II	LAB COURSE-VIII (PROJECT)	PPHCL407	02	100	-	100
Total			20	-	-	600

- H.O.D. - .....
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- Industrialist-.....

Alumni- .....

M.Sc. Physics [I & II Semester]

Year 2024-2025

The syllabus will consist of four theory paper and two practicable laboratory course in each semester wise course structure along with distribution of marks as follows:

OBJECTIVES:-

The benefits of career-oriented course can be extended to regular students. Education plays very vital in each and every person's life. The aim of college is to bring the quality education to the student in every aspect of life with view and looking at the future and of the M.Sc. in Physics.

Semester-I

Paper-1:	**Mathematical Physics**	[80 Marks]
Paper-2:	**Classical Mechanics**	[80 Marks]
Paper-3:	**Electrodynamics & Plasma Physics**	[80 Marks]
Paper-4:	**Electronic & Photonic Device Optical Modulation**	[80 Marks]
* Internal assesment in each paper		[20 Marks]
* Laboratory Course I-A		[100 Marks]
*Laboratory Course I-B		[100 Marks]

Semester-II

Paper-1:	**Quantum Mechanics-I**	[80 Marks]
Paper-2:	**Statistical Mechanics**	[80 Marks]
Paper-3:	**Electronics**	[80 Marks]
Paper-4:	**Computational Physics And Computer Programming**	[80 Marks]
* Internal assessment in each paper		[20 Marks]
* Laboratory Course I-A		[100 Marks]
*Laboratory Course I-B		[100 Marks]

M.Sc. Previous

Semester –I PHYSICS

Year :- 2024-2025

COURSE CODE :- PPHCT101

Paper -I MATHEMATICAL PHYSICS **Marks-80**

Unit-1

Vector space and matrices: - Linear independence , Bases, Dimensionality, Inner product , Linear, transformation matrices, Inverse matrix , Orthogonal and Unitary matrices, Eigen values and Eigen Vector, Diagonalization , complete orthogonal sets of functions, **complex variable :** Analytic function, Cauchy-Riemann condition, Cauchy integral formula, analytic function, necessary and sufficient conditions, Cauchy-Reimann equation in polar, Laplace equation; Laplace equation; Harmonic function line integral of a complex function, Derivations analytic function, singularities of an analytic function with examples.

Unit-2

Differential equation: - second order linear ODEs with variable coefficients, Solution by series expansion ,non -homogeneous differential equation and solution by the method of Green's function with application, Solution of second order differential equation with constant coefficient, power series solution ; Frobeniu's method .

Unit-3

Special function: - Legendere , Bessel , Hermite and Laguerre function with their physical applications , Generating function, Orthogonality condition , Recursion relations .

Unit-4

Integral Transforms: - Laplace form integral transforms , Properties of Laplace transforms Laplace transforms , First and second shifting theorems with example , Inverse Laplace Transforms , LT of derivative and integral of a function . Fourier series , FS or arbitrary period , half wave expansions partial sums , Fourier integral and transforms, Laplace transform of periodic functions, inverse Laplace theorem: Fourier Mellin theorem: properties of inverse Laplace transform, Simple Applications of fourier transform; (i) Evaluation of integrals (ii) Solution of Boundary value problems.

TEXT AND REFERENCE BOOKS :

1. **Mathematical Methods for Physics ,** **By G. Arfken .**
2. **Matrices and Tensors for Physicist ,** **By A. W. Joshi.**
3. **Advanced Engineering Mathematics ,** **By E.Kroyazig**
4. **Special Functions ,** **By E.B.Rainville.**
5. **Special Functions ,** **By W.W.Bell.**

H.O.D. - .....

- BY V.C. Nominated -.....
- Subject Expert - 1..... 2.....
- Faculty members – 1..... 2.....
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- Alumni- .....

M.Sc. Previous
Semester – I PHYSICS
Year :- 2024-2025
COURSE CODE :- PPHCT102
Paper – II CLASSICAL MECHANICS Marks-80

Unit-1

Preliminaries - Newtonian mechanics of one and many Particle system , Conservation law , Constraints & their classifications , Work Energy theorem open system (with variable mass) , Generalized coordinates ,generalized notations, Principle of vertual work , D' Alembert's Principle and Lagrange's equations Lagrangian for a charges particle in an electromagnetic field, deduction of Hamilton's principle from D' Alembert's Principle, Deduction of Newton's second law of motion from Hamilton's principle .

Unit-2

Deduction of a Lagrange's equation using variational principle for non-conservative system , Application of Lagrangian formulation , Simple pendulum , Jacobi Integral: Generalized coordinates and Moment Integrals of motion , symmetries of space and time with conservation law , Principle of least action , invariance under Galilean transformations rotating frames integral forces , astronomical applications of Coriolis force.

Unit-3

Hamilton's canonical equation of motion, physical significance of H, advantage of Hamiltonian approach, deduction of canonical equation from a Variational principle ,Central force definition and characteristics , two body problem , closure and stability of circular orbits , general analysis of orbits , Kepler's law and equation , principle of least action ,Hamilton's principle and characteristic function. Condition for a transformation to be canonical, Infinitesimal contact transformations, Canonical transformations , example of canonical transformation, Generating function .

Unit-4

Poisson bracket , Poisson theorem Angular momentum PBs, Small oscillations , Normal modes and coordinates. Rigid body dynamics- the Euler's angles , Euler's equation of motion ,rate of change of vector,invariance of Poisson bracket with respect to canonical transformation, Equation of motion in Poisson bracket form, Lagrange's brackets ,Relation between lagranges and Poisson bracket, Liouville's theorem.

TEXT AND REFERENCE BOOKS:

1. **Classical Mechanics : By N. C. Rana and P.S. Joag (Tata Mcgraw- Hill, 1991...).**
2. **Classical Mechanics : By H. Goldstein (Addison Wesley, 1980.).**
3. **Classical Mechanics : By H. Goldstein , C. Poole & J. Fafco (Pearson Education , Inc, 2002.).**
4. **Introduction to Dynamics : By Perceival and D. Richaeds (Cambridge University, press, 1982.).**

- H.O.D. - .....
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- Subject Expert - 1..... 2.....
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M.Sc. Previous
Semester – I PHYSICS
year :- 2024-2025
COURSE CODE :- PPHCT103
Paper – III ELECTRODYNAMICS & PLASMA PHYSICS Marks-80

Unit-I

Maxwell's equations, vector and scalar potentials and the wave equation, Gauge transformations, Lorenz gauge, Coulomb gauge, Green function for the wave equation, four-vectors, mathematical properties of the space-time in special relativity, matrix representation of Lorentz transformation, covariance of electrodynamics, transformation of electromagnetic fields.

Unit-II

Radiation by moving charges, Lienard-Wiechert potential and fields for a point charge, total power radiated by an accelerated charge- Larmor's formula and its relativistic generalization, angular distribution of radiation emitted by an accelerated charge, radiation emitted by a charge in arbitrary extremely relativistic motion, distribution in frequency and angle of energy radiated by accelerated charge.

Unit –III

Bremsstralung: emission from single-speed electrons, thermal Bremsstralung emission and absorption, Synchrotron radiation: spectrum of synchrotron radiation, spectral index for power law electron distribution, transition from Cyclotron to Synchrotron emission, Cherenkov radiation.

Unit-IV

Plasma: definition, Debye shielding phenomenon and criteria for plasma, motion of charged particles in electromagnetic field ,Fundamental equations of magneto- hydrodynamics (MHD), Hydrodynamics Waves; Magneto sonic and Alfven waves, Magnetic viscosity and magnetic pressure, plasma confinement schemes.

TEXT AND REFERENCE BOOKS:-

1. **Jackson, classical electrodynamics.**
2. **Rybicki & Lightman: Radiative Processess in Astrophysics**
3. **Panofsky and Phillips: Classical electricity and magnetism.**
4. **Bittencourt, Plasma physics**
5. **Chen: Plasma physics.**

- H.O.D. - .....
- BY V.C. Nominated -.....
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M.Sc. Previous
Semester – I PHYSICS
Year: 2024-2025
COURSE CODE :- PPHCT104
Paper – IV
ELECTRONIC & PHOTONIC DEVICES AND OPTICAL MODULATION Marks-80

Unit-1

Unipolar device: JFET , MESFET and MOSFET basic structure, working and device I-V characteristics, small signal equivalent circuit related field effect device, Microwave performance, charged coupled device (CCDs), basics structure and working , principal, MOSFET- basic device characteristics, types of MOSFET, UJT , SCR , triac operation VI characteristics of Triac, Triac rating , Application of Diac, Diac- operation, Diac V-I characteristics curve.

Unit-2

Special Microwave Devices: Quantum effect device, Resonant Tunneling diode, unipolar resonant tunneling transistor. Tunnel diode and backward diode-basic device characteristics, IMPATT diode and their statics and dynamic characteristics, Transfer electron device-transferred electron effect, Gunn diode, Negative differential resistance, Hot electron devices, Hot electron HBT, Real space Transfer Transistor.

Unit-3

Photonic Device: Radiative transitions and optical absorption optical cavity and feedback, LEDs: Visible LED and infrared, SC laser; Photo detectors ; Photo conductor, & Photodiode , SOLAR cell , Solar radiation and ideal conversion efficiency, p-n junction solar cells, Hetero junction, Interface thin film solar cells, Basic laser structure, Threshold current density, Quantum well laser, Silicon and compound –semiconductor solar cell, Optical concentration.

Unit-4

Optical Modulation and Display devices :- Optical fiber waveguides, Introduction: Optical fiber, Numerical aperture, Pulse dispersion in step index fibers, First and second generation fiber optic communication, Magneto-Optic and Acoustic-Optic effect , Materials exhibiting these properties , Non-linear Optics(self focusing, second harmonic generation)

Display devices: Luminescence, Photo- luminescence, Electroluminescence, Liquid crystal display (LCD), Numeric display .

Fiber - wave guides and optical communication system and networking.

TEXT AND REFERENCE BOOKS:

1. **Semiconductor Device: Physics and Technology, By SM Sze, Eiley (1985).**
2. **Introduction to semiconductor device. M.S. Tyagi , John Wiley and sons.**
3. **Measurement, Instrumentation and experimental design in physics and engineering By M. Sayer AND A. Mansingh, Prentice Hall India 2000.**
4. **Optical electronics By Ajay Ghatak and K.Thyagarajah, Cam. Univ. press.**
5. **Opto electronics – An Introduction : Jwilson and JFB Hawkes (Eastern Economy dition) .**

- H.O.D. - .....
- BY V.C. Nominated -.....
- Subject Expert - 1..... 2.....
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Practical list

Semester 1

Laboratory Course I- A Any ten of the following (PPHCL105)

1. Experiment of FET and mosfet characterization and application amplifier.
2. Experiment of Uni-junction Transistor and its application.
3. Digital I: Basic Logic Gates, TTL, NAND and NOR
4. Characteristics and applications of Sillicon Controlled Rectification.
5. Design of a regulated power supply.
6. Design of common emitter transistor amplifier.
7. Experiment on bias stability.
8. Negative feedback(voltage series/shunt and current series)

9 Measurement of resistivity of a semiconductor by four probe method at different temperatures and
determination of band gap.

10. Measurement of type of given semiconductors: identification of type semiconductor and estimation of charge carrier concentration.

11 Determination of e/m of electron by Normal Zeeman Effect using Febry- perot Etalon.

12 Determination of Dissociation energy of iodine (i) Molecule by photography the absorption bands of
I in the visible region.

13- a. Measurements wavelength of he-ne Laser light using ruler.
b. Measurement of thickness of thin wire with laser.

14 - plank constant

15 - Fiber optics

LAB-B (PPHCL106)

Construction
IC regulated power supplystable, monostable multivibrature
R.C. coupled ,schmitt trigger
other equivalent ckt
Regulated power supply

- H.O.D. - .....
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M.Sc. Previous
Semester - II physics
Year 2024-2025

COURSE CODE :- PPHCT201

Paper -I Quantum Mechanics-I **Marks-80**

Unit -1

Inadequacy of classical mechanics. Equation of motion of matter waves, physical interpretation of the wave function, Expectation value of dynamic quantities, probability current density: particle flux, Ehrenfest theorem, physical Applications of Schrodinger's equation the free particles, particle in a Box, potential step, Rectangular potential barrier, Application of barrier penetration (α- decay).Schrodinger equation , one-dimensional Infinitely deep potential well , Schrodinger equation for Linear Harmonic oscillator and its solution,Eigen values, Zero point energy, Uncertainty relations.

Unit- 2

Super position principle , general formalism of wave function , commutation relationship, representation of states and dynamical variable , Completeness of Eigen functions , Dirac-Delta function , Bra & Ket notation , Matrix representation of an operator ,Harmonic oscillator and its solution by matrix method , Heisenberg equation of motion .

Unit-3

Angular Momentum in quantum mechanics , commutation relationship, Eigen value addition of angular momentum , Clebsch-Gordon coefficient , spherically symmetric potential in three dimensional , separation of wave equation , three dimensional square well potential and energy level the Hydrogen atom , solution of the radial equation energy level and stationary state wave function ,.

Unit-4

Time-independent perturbation theory , non-degeneracy case, first order and second perturbation with the example of perturbation of an oscillation , degeneracy case ,removal of degeneracy of second order , first order stark effect in hydrogen perturbed energy level , Zeeman effect without electron.

TEXT AND REFERENCE BOOKS:

1. **H. Schiff quantum mechanics By McGraw-hill.**
2. **S.Gasiorowicz Quantum Physics .**
3. **Landauand Lifshitz Non-relative quantum mechanics.**
4. **B.Crasemen and Z.D.Powell Quantum mechanics addition westey.**
5. **A.P.Massiah Quantum mechanics.**
6. **J.J. SakurahModerrn Quantum Mechanics.**
7. **Mathews andVenketesan quantum mechanics.**

- H.O.D. - .....
- BY V.C. Nominated -.....
- Subject Expert - 1..... 2.....
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- Industrialist-.....
- Alumni- .....

M.Sc. Previous
Semester-II physics
year:- 2024-2025
COURSE CODE :- PPHCT202
Paper-II STATISTICAL MECHANICS

Marks-80

Unit-1

Foundation of statistical mechanics , contact between statistical and thermodynamics , the classical ideal gas , entropy of mixing and Gibb's paradox , phase space of classical system , Liouville's theorem and its consequence quantum state and phase space .Elements of ensemble theory: micro canonical and grand canonical ensemble , partition functions , physical significance of statistical quantities , example of classical system energy and energy density , fluctuation and mutual correspondence of various ensembles.

Unit-2

Formulation of quantum statistics : Quantum mechanical ensemble theory , Density matrix , statistics of various quantum mechanical ensemble , Ex: An electronic magnetic field, System compose of indistinguishable particles. Density matrix and the partition of a system of a free particles. theory of simple gases-ideal gas in various quantum mechanical, ensembles, Maxwell-Boltzmann , Bose- Einstein , Fermi-Dirac distributions ,statistical of occupation number.

Unit-3

Ideal Bose and Fermi gases: Thermodynamics of black body radiation, the field of sound waves, Inertial density of sound field. Thermodynamics behavior of an ideal Bose and Fermi gas of elementary particle , degenerate Bose gas , Bose-Einstein condensation and elementary excitations in liquid helium II ,Thermodynamic behavior of an ideal Fermi gas , Magnetic behaviors of an ideal Fermi gas, the electron gas , theory of Whit Dwarf Stars.

Unit-4

Statistical mechanics of interaction system the method of cluster expansion classical gas . viral expansion of the equation of the state. Evaluation of viral coefficient, Landan theory of phase transition-general remark on the problem of condensation Fluctuation , thermodynamic fluctuation . Brownian motion, Einstein and Langevin theory of Brownian motion , fluctuation dissipative theory. The Onsager relations., Unreal remark on cluster expansion Exact treatment of second viral coefficient .

TEXT AND REFERENCE BOOKS:

1. **R.K.Patharia- Statistical Mechanics.**
2. **L.D.Landau&E.M.Lifshitz .**
3. **Fedrick Rief - Fundamental of statistical and thermal physics.**

- H.O.D. - .....
- BY V.C. Nominated -.....
- Subject Expert - 1..... 2.....
- Faculty members – 1..... 2.....
- Industrialist-.....
- Alumni- .....

M.Sc. Previous
Semester-II Physics
Year-2024-2025
COURSE CODE :- PPHCT203
Paper-III ELECTRONICS

Marks -80

Unit-I

Operational amplifier :-Basic Op-amp. Ideal operational Amplifier Differential amplifier, Practical inverting Op-amp , the emitter coupled . difference amplifier , transfer characteristics of a diff. Amplifier , An example of an AC Op-amp , offset error voltage and currents, measurement of Op-Amp . Parameters, frequency response of an Op-Amp, Dominant-pole compilation.

Linear analogsystem : basic Op-Amp Application , Analog integration and differentiation ,Electronic Analog computation . Non-linear analogsystem , comparators ,wave form generator Schmitt Trigger.

Unit-II

Combinational Logic– Basic Logic gate : OR ,AND , NOT gates, NOR and NAND gates Boolean algebra , De-Morgan's theorem , exclusive OR gate , Decoder / Demultiplexer , Date Selector/multiplexer –.encoder , TTL circuit. Arithmetic-Logic units , adder ,

Sequential Logic flip-flop : R-S Flip-Flop, J-K Flip-Flop level clocking, Edge triggered Flip flop D Flip flop JK , Flip flop J.K master slave Resisters buffer shift and control shift resisters , ripple synchronous & ring counter , tri-resisters Memories: RAM , ROM , PROM , EPROM .

Unit-III

Microprocessors :- Evolution of microprocessor , organization of a microcomputer , programming of microprocessor , Basic concept ,data representation , binary number system , Floating point notation , organization of Intel 8085 . instruction set of 8085. Programming with 8085 . Assembly language programming , the stack , subroutines CPU of a microprocessor ,timing and control , system timing and interrupt timing of 8085 ,resistor in 8085 , interfacing memory and I/O device a preliminary ideas.

Unit-IV

Instruction set of 8085 type of instructions- Data transfer group ,Arithmetic Logic , branch group , stack I/O machine control group , addressing mode of Intel 8085 , example of Assembly language programs in 8085 , summing of two 8-bit number to result a 16-bit number , summing two 16-bit number. 8085 interrupt. 8085 recorded interrupts, microprocessor application designing scanned display, interfering a matrix keyboard, Memory design.

TEXT AND REFERENCE BOOKS

1.**Intgrated Electronics: J.Milliman R.C.C. Halkias**
2. **Electronics devices and circuit theory, by Robert Boylested and Nash PHI, New Delhi-110001, 1991**
3. **Operational Amplifier linear integrated circuits, by Romakanth A. Gayakwad PHI, second edition 1991.**
4. **Digital computer electronics by A.P. Malvino and Donald P. Lenach, Tata McGraw Hill company, New Delhi 1987.**
5. **Microprocessor architecture, programming applications with 8085/8086 by Ramesh S. Gaonkar, Willey-Eastem.limited 1987**
6. **Introduction to microprocessors-A.P. Mathur (Tata Mcgraw).**

- H.O.D. - .....
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M.Sc. Previous
Semester-II Physics
Year 2024-2025

COURSE CODE :- PPHCT204

Paper-IV

COMPUTATIONAL PHYSICS AND COMPUTER PROGRAMMING **Marks-80**

Unit-1

Method of determination of zeroes of linear and non linear algebraic equation and transcendental equation , convergence of solution , Solution of simultaneous linear equations , Gaussian elimination , pivoting , iterative method matrix inversion , Eigen value and Eigen vector of matrices , power and Jacobi method. factorization method, givens method, house holders methods partition method.

Unit-2

Finite differences , interpolation with equally spaced and unevenly spaced point , Gauss Interpolation, curve fitting , polynomial least squares and cubic spline fitting , Numerical differentiation and integration , Newton-cotes formulae , Gauss method, Sterling formula, Law containing three constant. Error-error estimate.

Unit-3

Numerical solution of ordinary differential equation , Run's method , Modified Euler method, Euler and Runga-Kutta methods , predictor-corrector method, Milne's and Adam's predictor and Picard's method ,corrector method, taylor series method , stability analysis.

Unit-4

Elementary information about digital computer principle , compilers , interpreters ,subroutine ,Computer Representations of number, Floating points presentations of number ,computer calculations ,Numerical method using C language , An overview of C features ,Example ;-Multiplications of matrices ,Gauss- Eliminations method ,Gauss –Jordan method ,Factorizations method ,Gauss –Seidal iterations method ,Power method ,Method of Least squares, Method of averages ,Method of moments Newton forward interpolations method , Langranges interpolations formula ,Derivatives using forward differences formula …

TEXT AND REFERENCE BOOKS:

1- **Sastry : Introduction method of Numerical Analysis**
2- **Rajaraman: Numerical Analysis**
3- **B.S.Garewal : Numerical Analysis**

Note- scientific calculator allowed.

- H.O.D. - 20/5/2024
- BY V.C. Nominated -.....
- Subject Expert - 1..... 20-5-24 ..... 2.....
- Faculty members – 1..... ..... 2.....
- Industrialist-.....
- Alumni- .....

PRACTICAL LIST
Semester -II
LAB –III (PPHCL-205)

1- Opto electronics
2- Four probe method
3- Thermoluminisence
4-Photo transistor
5-Photo diode
6-Constant deviation spectrometer
7-Numerical aperture of optical fiber
8-A to D converter
9- D to A Converter
10-Microprocessor
11-Flip flop
12-Hall effect
13-Runge kutta
14-Enters method
15-Newton rap son method
16 Octal to binary encoder

LAB-IV (PPHCL-206)

Construction
IC regulated power supply, stable, monostable multivibrature
R.C. coupled ,Schmitt trigger
other equivalent ckt

- H.O.D. - .....
- BY V.C. Nominated -.....
- Subject Expert - 1..... 2.....
- Faculty members – 1..... 2.....
- Industrialist-.....
- Alumni- .....

M.Sc. Physics| III & IV Semester |
Year 2024-2025

The syllabus will consist of four theory paper and two practicable laboratory course in each semester wise course structure along with distribution of marks as follows:

OBJECTIVES:-

The benefits of career-oriented course can be extended to regular students. Education plays very vital in each and every person's life. The aim of college is to bring the quality education to the student in every aspect of life with viev and looking at the future and of the M.Sc. in Physics.

Semester-III

Paper-1:	**Quantum Mechanics-II**	[80 Marks]
Paper-2:	**Atomic & Molecular Physics**	[80 Marks]
Paper-3:	**Solid State Physics- I**	[80 Marks]
Paper-4:	**Electronics-I**	[80 Marks]

.

* Internal assessment in each paper	[20 Marks]
* Laboratory Course I-A	[100 Marks]
*Laboratory Course I-B	[100 Marks]

Semester-IV

Paper-1:	**Nuclear & Partical Physics**	[80 Marks]
Paper-2:	**Laser Physics & Application**	[80 Marks]
Paper-3	**Solid State Physics- II**	[80 Marks]
Paper-4:	**Electronics**	[80 Marks]

* Internal assessment in each paper	[20 Marks]
* Laboratory Course I-A	[100 Marks]
*Laboratory Course I-B	[100 Marks]

M.Sc. Final

Semester-III physics

Year 2024-2025

COURSE CODE :- PPHCT301

Paper-I Quantum Mechanics -II **Marks-80**

Unit-I

Variation method; WKB approximation; approximation solution, solution near a turning point, turning point, connection at the turning point, Expectation value of energy; Application to excited states; Ground state of He-atom; Vander walls interactions energy level of a potential well and quantization rule ,Adiabatic and sudden approximations

Unit-II.

differential scattering cross section and total scattering cross section; Wave mechanical picture of scattering . Scattering amplitude; Green functions and formal expression for Scattering, amplitude Scattering by spherically symmetric potentials; Partial waves analysis, asymptotic behaviors of Partial waves and phase shifts; Scattering by a perfectly rigid sphere and by square well potential; Scattering by Coulomb potential,. Parabolic coordinate confluent hyper geometric function .

Unit-III

Time dependent perturbation theory, interaction picture, first order perturbation; Harmonic perturbation; Fermi's golden rule; Ionization of a H atom, density of final state, Transition probability for absorption and induced emission; Electric dipole and forbidden transitions; selection rules Symmetric and ant symmetric wave functions.

Unit-IV

Relativistic quantum mechanics , Relativistic quantum theory the Klein - Gorden equation ,plain wave solution, The Dirac equation for a free particle ,matrices alpha and beta, charge density and current density, Lorentz covariance of the Dirac equation, Spin angular momentum; Dirac equation for central field; Dirac particles in electromagnetic fields and significance of the negative energy state.

TEXT AND REFERENCE BOOKS

1-L.I.Schiff quantum mechanics

2- Satya prakash Advanced quantum mechanics

3- A.P.Messiah ; quantum mechanics

4- Methews and Venkatesan; quantum mechanics

- H.O.D. - .....
- BY V.C. Nominated -.....
- Subject Expert - 1.....2.....
- Faculty members – 1.....2.....
- Industrialist - .....
- Alumni - .....

M.Sc. Final
Semester-III Physics
Year 2024-2025
COURSE CODE :- PPHCT302
Paper-II Atomic &Molecular Physics Marks -80

Unit-I

Somerfield theory of hydrogen atom, application of quantization, quantization of elliptical orbits, Somerfield elliptical orbits, relativistic correction to Somerfield elliptical orbits, fine structure of H alpha line, fine structure of He^{+} line, selection rule for azimuthally quantum number, magnetic moment of atom and land's g factor, Larmour's theorem, Quantum States of one electron atoms; Atomic orbital; Hydrogen Spectrums Spin-orbit (l-s) interaction energy, fine structure 0f Hydrogen Spectrums including (l-s) interaction and relativistic correction, Spectra of Alkali element , doublet fine structure in alkali Spectra , intensity rules .

Unit-II

Pauli Exclusion principle , quantum mechanical treatment of fine structure, Pauli's principle Ground state(basic level of different element) two electron system, interaction energy in L-Sand J-Jcoupling . fine structure, Hyper fine structure, line broadening mechanisms (general ideas), Normal and anomalous Zeeman Effect, relativistic correction, interpretation of hyper fine structure, quantum mechanical treatment of hyper fine structure.

Unit-III

Vector models of one electron system in a week magnetic field, magnetic moment of a bound electron , magnetic interaction energy selection rules , Zeeman effect of principle series doublet. Zeeman effect , Paschen Back effect , Stark effect in Hydrogen ,orbital model, weak and strong effect in Hydrogen, landau's factor for two valence electron system, (in L-S and JJ coupling) linear stack effect (hydrogen atom) Zeeman effect in two electron system .

Unit-IV

Types of molecules; Diatomic linear symmetric top; asymmetric top and spherical top molecules; Rotational spectra of diatomic molecules as a rigid rotator-Energy levels and spectra of non rigid rotator, determination of the inter nuclear distance (bond length) and momentum of inertia, isotopes effect in rotational spectra, isotope effect in vibrational bands, application of vibrational spectroscopy, Vibrational energy of diatomic molecule; Diatomic molecule as a simple harmonic oscillator, P,Q and R branches (qualitative) .

TEXT AND REFERENCE BOOKS

1 - **Introduction to atomic spectra -H.E.white**
2- **Spectroscopy Vol ,1II III- walker and straughner**
3- **Molecular Spectroscopy-J.M.BROWN**
4- **atomic physics –raj kumar**
5- **atomic physics –J b rajam**

- H.O.D. - 20.5.2024
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- Alumni- .....

M.Sc. Final
Semester-III physics
Year 2024-2025
COURSE CODE :- PPHCT303

Paper-III Solid State Physics-I **Marks -80**

Unit-I

Electrons in Solid and Electronic properties - Energy band : nearly free electron model ,origin of energy gap and its magnitude, Bloch function , Kronig-penny model ,Wave equation of electron in periodic potential restatement of Bloch theorem ,crystal moment of an electron , kronig-penny model in reciprocal space empty lattice Approximation , Approximation solution near zone boundary. Number of orbital in a band, metals and insulator.

Unit-II

Fermi surface and metals-free electron Gas in three dimension ,construction of Fermi surface, nearly free electron, hole open orbits Calculation of energy bands. Tight binding, Wigner -Seitz, Cohesive energy, pseudo potential methods, Quantization of orbits in a magnetic field, de Hass van Alphen Effect, External orbits, Fermi surface of copper.

Unit-III

Crystal vibration and thermal properties Lattice dynamics in diatomic lattice: two atoms per primitive basis, optical and acoustic modes, quantization of elastic waves, phonon momentum, inelastic neutron scattering by phonon. , Anharmonic crystal interactions-thermal expansion, thermal conductivity, thermal resistivity of phonon gas, unklapp processes, imperfections.

Unit-IV

Electron-Phonon interaction-superconductivity Experimental survey: occurrence of superconductivity, Meissener effect, heat capacity, energy gap, , isotope effect, London equation, Coherence length, Cooper pairing due to phonons, BCS theory of superconductivity, BCS ground state, flux quantization of superconducting ring, duration of persistent currents, Type II superconductors, Vertex states, and Josephson superconductor tunnelling , DC/AC Josephson effect.

TEXT AND REFERENCE BOOKS

1-C.Kittle;Introduction to Solid state Physics
2-Verma and srivastava ; Elementary dislocation Theory
3-Kittle ;Quantum theory of solids
4-Bueager ;crystal structure analysis

- H.O.D. - 20/5/2024
- BY V.C. Nominated -.....
- Subject Expert - 1..... 2.....
- Faculty members – 1..... 2..... 20/5/24
- Industrialist-.....
- Alumni- .....

M.Sc. Final
Semester-III Physics
Year 2024-2025
COURSE CODE :- PPHET304
Paper- IV Electronics-II Marks:80

Unit-I

Microwave devices:klystron (reentrant cavities, velocity modulation, bunching process, output power and beam loading, efficiency of klystron, mutual conductance of klystron amplifier, power required to bunch the electron beam); magnetrons and traveling wave tube; velocity; modulation. Basic principles of two cavity Klystrons and reflex klystrons; principle of operation of magnetrons; helix travelling wave tube; wave modes, slow wave structure, amplification process convention current, axial electric field, wave mode, coupled cavity travelling-wave tube(physical description, principal of operation, microwave characteristic, high efficiency and collector voltage depression .

Unit-II

Microwave guides and components (Wave Modes):-

(A) Rectangular wave guides: - power transmission in rectangular wave guide, power losses in rectangular wave guide, solutions of wave equation in rectangular coordinates, TE Modes; TM Modes; excitation of modes in rectangular wave guides, characteristic of standard rectangular wave guide.

(B) Circular wave guides:-solutions of wave equations in cylindrical coordinates ; TE Modes; TM Modes; TEM Modes; excitation of modes in circular guides, power transmission in circular wave guide or coaxial line, power losses in circular wave guide or coaxial lines.

Unit-III

Transferred electron devices:-Gunn effect Principle of operation; modes of operation; read diode; IMP ATT diode; TRAP ATT diode, baritt diode.

Computer Communications:- Types of network ,design feature of a communication network; advantage and disadvantage

Example –TRMNET,ARPANET ISDN LAN, FDMA, TDMA, CSMA.

Unit-IV ,

RADAR:-RADAR Block diagram and operation RADAR frequency; RADAR range equation and its derivation, minimum detectable signal; receiver noise; signal to noise ratio; Probability density function . Integration of RADAR pulse;

Satellite Communications:-Orbital Satellite; Geostationary satellites; Orbital Pattern, look angle, satellite system; orbital spacing.

TEXT AND REFERENCE BOOKS

1-Advanced electonics Communication system by wayne and tomsi
2-Principle Of communication -By Toub And schilling
3Micro wave devices circuits by Samuel,YIIAU
4-Electornics communication ;georgekennedy

- H.O.D. - 20.5.2024
- BY V.C. Nominated -.....
- Subject Expert - 1..... 20.5.24 2.....
- Faculty members – 1..... 2..... 29/5/24
- Industrialist-.....
- Alumni- .....

M.Sc. Final
Semester-III PHYSICS
Year 2024-2025
COURSE CODE :- PPHET305
PAPER- IV
(A) ASTRONOMY AND ASTROPHYSICS-I Marks -80

Unit – I

Stars-apparent magnitudes, Colour index, Spectral classification, Stellar distances, Absolute magnitude, The H-R diagram of stars. Stellar interiors: The basic equations of stellar structure, Hydrostatic equilibrium, Thermal equilibrium, Virial Theorem, Energy sources, Energy transport by radiation and convection, Equation of state.

Unit – II

Formation and evolution of stars: Inter stellar dust and gas, Formation of protostars, Pre-main sequence evolution, Post main sequence evolution and Evolution on the main sequence for low and high mass stars, Late stages of evolution, Fate of massive stars, Supernovae and its characteristics.

Unit – III

End states of stars, Electron degeneracy pressure, White dwarfs, and Chandrasekhar limit, Neutron stars and Pulsars, Black holes. Binary stars and their classification, close binaries, Roche Lobes, Evolution of semidetached systems: Algols, Cataclysmic variables and X-ray binaries.

Unit– IV

Solar Physics: Physical Characteristics of sun, Photosphere: Limb darkening, Granulation, Faculae, Solar Chromosphere and Corona, Prominences, Solar Cycle and Sunspots, Solar Magnetic Fields, Theory of Sunspots, Solar flares, solar wind, Helioseismology.

TEXT AND REFERENCE BOOKS:

1. Astrophysics for Physicists, Arnab Rai Choudhuri, Camb. University Press, 2010.
2. Modern Astrophysics, B.W. Carroll and D.A. Ostlie, Addison-Wealey Pub. Co.
3. Introductory Astronomy and Astrophysics, M.Zeilik and S.A. Gregory, 4th edition, Saunders college publishing.
4. The Physical Universe: An introduction to astronomy, F.Shu, Mill valley : University science books.
5. Textbook of astronomy and astrophysics with elements of cosmology, V.B.Bhatia, Pb -New Delhi, Narosa publishing house.

- H.O.D. - .....
- BY V.C. Nominated -.....
- Subject Expert - 1..... 2.....
- Faculty members – 1..... 2.....
- Industrialist-.....
- Alumni- .....

Practical list

Semester III

LAB-V (PPHCL-306)

1. Study of encoder and decoder
2. Logic gated & RTL
3. J-k master slave flip-flop
4. Half adder by using NAnd and Nor gates
5. Non –inverting op-amp

6- Study of left/right shift register

7- Study of four bit counter/ripple counters
8 - Modulation
9- To study the hall coefficient …
10- To Study the CB circuit..
11- To Study the CC circuit
12- To Study the CE circuit
13- To measures the percentage modulations

LAB-VI (PPHCL-307)

1. Assemble project kit

- H.O.D. - .....
- BY V.C. Nominated -.....
- Subject Expert - 1..... 2.....
- Faculty members – 1..... 2.....
- Industrialist-.....
- Alumni- .....

M.Sc. Final
SEMESTER-IV - PHYSICS
Year 2024-2025
COURSE CODE :- PPHCT401
PAPER –I NUCLEAR AND PARTICAL PHYSICS Marks :80

Particle

UNIT-1

NUCLEAR INTERACTION :-Nucleon –nucleon interaction ; Two - Nucleon System of the Ground State of the Deuteron ; Tensor force; Nucleon-nucleon Scattering at Low Energies, Scattering length; Effective Range Theory in n-p Scattering ; Spin Dependence of Nuclear force; Charge independence and charge symmetry of nuclear force; Iso-spin formalism, exchange forces; meson theory of nuclear force and the Yukawa interaction. Saturation of Nuclear force, Isotopic spin formalism ..

UNIT-2

NUCLEAR DECAY:- **Beta decay**: Fermi's theory for Beta decay; shape of beta spectrum; total decay rate angular momentum and parity selection rules; comparative half-lives; allowed and forbidden transitions selection rules; parity violation two component theory of neutrino decay; Detection and properties of neutrino; **Gamma decay**: Measurement of Gamma ray energies Multipole transition in nuclei angular momentum and parity selection rules; Internal conversion, Nuclear isomerism. Internal pair creation.

UNIT-3

NUCLEAR MODEL:- Liquid drop model , Semi-Empirical Mass Formula; Bohr-Wheeler theory of fission ; Shell Model; Experimental evidence for shell effects; Single particle shell model: Spin-Parity prediction, Prediction of ground state term , spin-orbit interaction and magic numbers; Analysis of shell model prediction; Magnetic moments and Schmidt lines; Collective model ..

UNIT-4

ELEMENTARY PARTICAL PHYSICS:- Classification of fundamental interaction ; Classification of Elementary particles; Symmetry , Conservation law :Exact and Approximate , Lepton's and Hadrons, Special Symmetries : SU(2) and SU(3) multiple and their properties; Quark model; Coloured Quarks , Isospin of quarks, Heavy quark effective theory, properties of quarks, Q-equation and threshold energies; Direct and compound nuclear interaction.

TEXT AND REFFERENCE BOOKS

1. **R.R. ROY and B.P. NIGAM, Nuclear physics, Wiley-Easterm ltd 1983,**
2. **M.K.PAL theory of nuclear structure, affiliated East West, Madrras1982,**
3. **Kenneth S Kiane Introductory Nuclear physics..**

- H.O.D. - .....
- BY V.C. Nominated -.....
- Subject Expert - 1..... 2.....
- Faculty members – 1..... 2.....
- Industrialist-.....
- Alumni- .....

M.Sc. Final
Semester-IV PHYSICS
Year 2024-2025
COURSE CODE :- PPHCT402
PAPER-II LASER PHYSICS AND APPLICATIONS Marks-80

UNIT-1.

Laser characteristics :- Spontaneous and stimulated emission; Einstein's quantum theory of radiation; **Beam characteristics** :- Directionality , intensity , coherence and mono chromaticity, kinetic of optical absorption, line broadening mechanism, Basic principle of lasers population inversion; laser pumping; two & three level laser system; resonator; Q-factor; losses in cavity; threshold condition ; quantum yield.

UNIT-2.

Laser system :- Solid state laser- the ruby laser; Nd :YAG Laser, ND-Glass laser, semiconductor laser; features of semiconductor laser; intrinsic semiconductor laser; Gas laser neutral; atom gas laser; He-Ne laser; molecular gas laser CO2 laser; Liquid laser; dye lasers and chemical laser. Electro ionization laser, Gas dynamic laser, Copper vapor laser, Ion laser, metal vapor laser.

UNIT-3.

Multi-Photon processes :- multi quantum photoelectric effect; theory of two-photon process; three-photon process; second harmonic generation; parametric generation of light ; Parametric light Oscillator, frequency up conversion Laser spectroscopy; Rayleigh and Raman scattering Stimulated Raman effect; Hyper-Raman effect;(Classical treatment), Coherent anti-stokes Raman Scattering; Photo-acoustic Raman spectroscopy. Spin flip Raman laser, Brillouin scattering.

UNIT-4.

Laser application :- isotope separation, thermonuclear fusion; laser application in chemistry , biology astronomy engineering and medicine, communication by laser; Ranging fiber optics communication optical fiber. Absolute rotation of earth.

Advanced in laser physics – production of giant pulse, Mechanical shutter, Electro optical shutter, shutter using saturable dyes .Q-switching, giant pulse dynamics, and laser amplification, mode locking and pulling.

TEXT AND REFFERENCE BOOKS—

1.B.B.Loud; Laser and nonlinear optics,
2. Thyagarajan, K and Ghatak, A.K;Laser Theory and application,
3.-Segiman, A.F. Laser..

- H.O.D. - .....
- BY V.C. Nominated -.....
- Subject Expert - 1..... 2.....
- Faculty members – 1..... 2.....
- Industrialist-.....
- Alumni- .....

M.Sc. Final

Semester-IV PHYSICS
Year 2024-2025
COURSE CODE :- PPHCT403
PAPER- III SOLID STATE PHYSICS – II 80 Marks

UNIT-1.

Dielectric and ferroelectrics – Polarization, dielectric constant macroscopic electric field, depolarization field ,E1; local electric field at an atom, Lorentz field E2, fields of dipoles inside cavity E3; dielectric constant polarizability and electronics Polarizability ; Ferro-electric crystal classification dissipative transition, Landau theory of phase transition, first and second order transition, anti ferro-electricity, ferro-electric domain , Piezoelectricity , Thermodynamic theory of the Ferro electric transition, second order transitions, first order transistion.

UNIT-2.

Ferromagnetism and anti ferromagnetism –Ferromagnetism order, curie point and exchange integral, temp. dependence of saturation magnetization at absolute zero; magnons, quantization of spin wave, thermal excitation of magnon; neutron magnetic scattering , ferromagnetic order, Curie temp and susceptibility of ferro- magnetic, iron garnets Anti ferromagnetic order , susceptibility below Neel temp , Anti ferromagnetic magnon, ferromagnetic domains. Magnon in ferro magnets, Neel model of ferrimagnetism, Neel model of Antiferrimagnetism .

UNIT -3.

Magnetism – Diamagnetism, Langevin theory of paramagnetic, Langevin theory of Diamagnetism, quantum theory of paramagnetic rare earth ions, iron group ions. Paramagnetism ,temp. dependent paramagnetism , Pauli paramagnetism

Plasma optics – transverse optical modes in plasma , longitudinal plasma oscillation **Plasmons**:- electrostatics screening and screened Coulomb potential , Mott metal insulator transition, screening and phonons in metal.

UNIT-4.

Defects- lattice vacancies Schottky and Frenkel point defect, colour center, f center, formation of F center, Energy level of F center and magnetic properties, F' center, V center, line defect Shear strength of single crystal.
Dislocation – edge and screw dislocation burger vector , Stress field of dislocation Low angle grain boundaries , Role of dislocation in plastic deformation and crystal growth mechanism of plastic deformation in solid.

TEXT AND REFFERENCE BOOKS—

1. C.kittle; Introduction to solid state physics,
2.-Verma and srivastva; Elemantry dislocation Theory,
3.-Kittle; Quantum theory of solids.
4.- Thomos; Elentry Solid state physics,
5.-Chalking and Lubensky; Principle of Condensed Matter Physics

- H.O.D. - .....
- BY V.C. Nominated -.....
- Subject Expert - 1..... 2.....
- Faculty members – 1..... 2.....
- Industrialist-.....
- Alumni- .....

M.Sc. Final
Semester-IV PHYSICS
Year 2024-2025
COURSE CODE :- PPHET404
PAPER-IV ELECTRONICS -III

Marks:80

UNIT-1

Communication system – Introduction , Elements of a communication system , modulation, Need of modulation, Analog and Digital Signal, Analog and Digital Communication, advantages and disadvantages of digital communications .

Digital Modulation Technique –PSK, FSK, BPSK, DPSK, QPSK, generation and detection, Probability of error.

UNIT-2

Digital Communication – Pulse modulation system; Sampling theory- Low-Pass and Band-Pass signals; PAM Channel BW for a PAM signals; Natural Sampling ; Flat-top sampling; Signal Recovery through holding; Quantization of signal ;Quantization error; Differential PCM; Delta Modulation; Adaptive Delta Modulation; CVSD, pulse code modulation, electrical representation of binary digit, vocodes (voice codes), channel vocodes, linear prediction codes.

UNIT-3

Mathematical Representation of Noise-Source of Noise; Frequency Domain; Representation of Noise; Effect of filtering on the Probability; Density of Gaussian Noise; Spectral Component of Noise ; Effect of a filter power spectral; density of Noise; Super Position of Noise; Mixing involving Noise; Linear filtering; Noise Bandwidth, Quadrature Component of Noise; Power Spectral Density of ns(t), ns(t) and their time derivative, representation of noise using orthonormal co ordinates ,.irrelivant noise components .

UNIT-4

Noise in pulse-code and Delta Modulation System- PCM Transmission; Calculation of Quantization noise; output signal Power; Effect of Thermal Noise; output signal to Noise Ratio in PCM; DM; Quantization of Noise in DM ,Output signal power; DM output signal to Quantization Noise Ratio; Effect of thermal Noise in Delta Modulation ; output signal to noise ratio in DM, comparison of PCM and DM , the space shuttle ADM.

TEXT & REFFERNCE BOOKS-

1- **Advanced electronic Communication system by wayne and tomsi,**
2- **Principle Of communication – By Toub and Schilling and Simon-Naykin,**
3- **Micro wave devices circuits by Samuel, YI.IAU ,**
4- **ELCTRONIC communicaton;georgekenndy**
5 **Principle Of communication – By Simon-Naykin**

- H.O.D. - .....
- BY V.C. Nominated -.....
- Subject Expert - 1..... 2.....
- Faculty members – 1..... 2.....
- Industrialist-.....
- Alumni- .....

M.Sc. Final
Semester-IV PHYSICS
Year 2024-2025
COURSE CODE :- PPHET405
Paper- IV (A) ASTRONOMY AND ASTROPHYSICS – II

Marks : 80

Unit– I:

The Milkyway Galaxy: Structure of the Milkyway, Oort's theory of galactic rotation, Dynamics of the spiral arms, Distribution of Interstellar matter, Central regions of the Milkyway.Normal Galaxies: Classification of galaxies, Hubble sequence: Elliptical, Lenticulars and Spiral galaxies, and their properties, Brightness profiles, Distribution of gas and dust in galaxies.

Unit- II:

Active galaxies: Active Galactic Nuclei (AGNs), Seyfert galaxies, BL Lac Objects, Radio galaxies: General properties, Superluminal motion, Quasars: Properties and Energy requirements, Nature of quasar redshifts, Supermassive black hole model and Unified model of AGNs.

Unit- III:

Cosmology: Cosmological principle, Observational support and other arguments to support cosmological principle, Fundamental observers and co-moving frame, Robertson-Walker line element (without derivation), Observational features of Robertson-Walker space time e.g. Red shift etc, Models of the universe, Friedmann models, Quanlitative predictions of FRW model, Quantitative solutions, Open and closed universes, Hubble's law, Angular size, Source counts, Models with the cosmological constant, Steady state cosmology.

Unit- IV:

Relics of the big bang, The early universe, Thermodynamics of the early universe, Thermal History, Primordial neutrinos, Helium synthesis and other nuclei, Microwave background, The very early universe, The formation of structures in the Universe, Jeans Mass, Growth Rate, Recombination era, Onset of matter dominated era.

TEXT AND REFERENCE BOOKS:

1. Astrophysics for Physicists, Arnab Rai Choudhuri, Cambridge Uni.ty Press, 2010.
2. Modern Astrophysics, B.W. Carroll and D.A. Ostlie, Addison-Wealey Pub. Co.
3. Introductory Astronomy and Astrophysics, M.Zeilik and S.A. Gregory, 4 th edition, Saunders college publishing.
4. Theoretical Astrophysics, vol. – II: Stars and stellar systems, T. Padmanabhan, Cambridge university press.
5. The Physical universe: An introduction to astronomy, F.Shu, Mill valleyUniversity science books.

- H.O.D. - .....
- BY V.C. Nominated -.....
- Subject Expert - 1..... 2.....
- Faculty members – 1..... 2.....
- Industrialist-.....
- Alumni- .....

PRACTICAL LIST

Semester -IV

LAB –VI (PPHCL-406)

1-project work

The facilities to be provided for students to visit National level Science institution.

LAB-B (PPHCL-407)

1- Instrumentation

- H.O.D. - .....
- BY V.C. Nominated -.....
- Subject Expert - 1..... 2.....
- Faculty members – 1..... 2.....
- Industrialist-.....
- Alumni- .....