

CLUSTER UNIVERSITY: KURNOOL

(Established Under AP Act No. 13 of 2020 and Recognised 2(f) by UGC Act 1956)

B-Camp, KURNOOL-518 002, Andhra Pradesh



BOARD OF STUDIES IN PHYSICS

(As per the new regulations of APSCHE w.e.f. A.Y 2025-26)

Date: 08-12-2025

Syllabus for 4-Year UG Honours in B.Sc. (Physics) as Major in consonance with Curriculum framework w.e.f. AY 2025-26

CURRICULUM FOR I-YEAR B.Sc. PHYSICS

Semester-I & II (Major & Minor)

For the Academic year 2025-2026

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INTRODUCTION

B.Sc Honours Physics

Physics is the fundamental science that explains the laws governing nature, from sub-atomic particles to the vast expanse of the universe. In the present era of rapid scientific and technological advancement, Physics education must continuously evolve to address emerging challenges, innovations, and the changing global ecosystem. B.Sc. Physics (Honours) is a need-based, concept-driven and skill-oriented programme designed to equip students with strong analytical abilities, scientific temperament, and problem-solving skills essential for academic excellence, research, industry, and societal development.

In accordance with the **National Education Policy (NEP) 2020** guidelines, the **Andhra Pradesh State Council of Higher Education (APSCHE)** has introduced a new curricular framework for undergraduate programmes. The **B.Sc. Physics (Honours)** programme has been structured and offered accordingly from the **academic year 2023–24**, emphasizing multidisciplinary learning, flexibility, and outcome-based education.

The programme provides comprehensive knowledge in **classical mechanics, electricity and magnetism, quantum mechanics, atomic and nuclear physics, solid state physics, mathematical physics, electronics, computational physics, and modern experimental techniques**. Equal importance is given to theoretical foundations, laboratory experiments, computational tools, data analysis, and emerging areas of Physics..

The B.Sc. Physics (Honours) curriculum aims to prepare students for **higher education, scientific research, teaching, competitive examinations, and employment in industries such as electronics, energy, materials science, data analytics, instrumentation, and technology-driven sectors**. The programme also nurtures innovation, critical thinking, and interdisciplinary collaboration, thereby contributing to national development and global scientific progress.

Academic Programme and Admission:

The **B.Sc. Physics (Honours)** programme is offered for **four years** under the **semester system**, in accordance with APSCHE regulations, and includes **short-term and long-term internships, project work, skill enhancement courses, and research-oriented training**. Students who have passed **Intermediate (10+2) with Physics, Chemistry, and Mathematics** or equivalent science streams recognized by APSCHE are eligible for admission. The programme is designed to transform students from passive learners into competent professionals, researchers, and innovators capable of meeting the evolving demands of academia, industry, and society.

Composition of Board of Studies in Physics for the Academic Year 2025-26, 2026-2027 & 2027-2028

S.No.	Name of the Faculty	Designation	Name of the College
1.	Dr. Mohammed Waaiz	Chairman	Dept. of Physics, Silver Jubilee Govt. College, Kurnool-518002, A.P Mobile:9849793821 Email: mdwaaizphysics@gmail.com
2.	Prof. C.V.Krishna Reddy	University Nominee	Dept. of Physics, Rayalaseema University, Kurnool- 518 007, A.P. Mobile: 9989642920 Email: reddyckv02@yahoo.co.in
3.	Smt S.Vasavi Devi	Subject Expert	Dept. of Physics, KVR Govt. Degree College for Women, Kurnool-518002. AP Mobile: 9515507034 Email: s.vasavidevi@gmail.com
4.	Dr M Shanawaz Begum	Subject Expert	Dept. of Physics, Silver Jubilee Govt. College, Kurnool-518002, A.P Mobile: 9849863201 Email: drshanawazbegum@gmail.com

Functions:

- Preparation and approval of syllabi of B. Sc. Hons. Physics for the academic years 2025-26,2026-27 & 2027-28 for Cluster University keeping in view the objectives of the university, interest of the stake holders and national requirement for consideration and approval of the Academic senate.
- Suggestions if any, regarding methodologies for innovative and evaluation techniques
- Suggestions if any, regarding research, teaching, extension and other academic activities in the Physics Department of Cluster university
- Recommending panel of names to the Academic Senate for appointment of Papers Setters and Examiners



ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION

Model Syllabus for 4-Year UG Honours in B.Sc. (Physics) as Major in consonance with Curriculum framework w.e.f. AY 2025-26

COURSE STRUCTURE (for Semester I to VI)

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
I	I	1	Introduction to Mathematical Physics	3	3
			Introduction to Mathematical Physics-Practical	2	1
		2	Mechanics and Properties of Matter	3	3
			Mechanics and Properties of Matter-Practical	2	1
	II	3	Waves and Optics	3	3
			Waves and Optics-Practical	2	1
		4	Heat and Thermodynamics	3	3
			Heat and Thermodynamics-Practical	2	1
II	III	5	Atomic, Molecular & Nuclear physics	3	3
			Atomic, Molecular & Nuclear physics-Practical	2	1
		6	Basic Electronics	3	3
			Basic Electronics-Practical	2	1
		7	Applied Optics	3	3
			Applied Optics-Practical	2	1
	IV	8	Electricity, Magnetism and Electromagnetic Theory	3	3
			Electricity, Magnetism and Electromagnetic Theory-Practical	2	1
		9	Analog Electronics	3	3
			Analog Electronics-Practical	2	1
		10	Advances in Physics	3	3
			Advances in Physics-Practical	2	1
III	V	11	Introduction to Solid State Physics	3	3
			Introduction to Solid State Physics-Practical	2	1

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
		12 A	Electronic Instrumentation	3	3
			Electronic Instrumentation-Practical	2	1
		OR			
		12 B	Solar Energy and Applications	3	3
			Solar Energy and Applications-Practical	2	1
		OR			
		12 C	Fundamentals of Nano Science	3	3
			Fundamentals of Nano Science-Practical	2	1
		OR			
		12 D	Solar, Thermal and Photovoltaic Conversion	3	3
			Solar, Thermal and Photovoltaic Conversion-Practical	2	1
		OR			
		12 E	Fundamentals of Python and Numerical Methods	3	3
			Fundamentals of Python and Numerical Methods-Practical	2	1
		13 A	Electronic Devices and Circuits	3	3
			Electronic Devices and Circuits-Practical	2	1
		OR			
		13 B	Low Temperature Physics and Refrigeration	3	3
			Low Temperature Physics and Refrigeration-Practical	2	1
		OR			
		13 C	Synthesis of Nano Materials	3	3
			Synthesis of Nano Materials-Practical	2	1
		OR			
		13 D	Wind, Hydro, Ocean & Geo-thermal Energy	3	3
			Wind, Hydro, Ocean & Geo-thermal Energy-Practical	2	1
		OR			
		13 E	Computations in Mechanics, Waves and Oscillations	3	3
			Computations in Mechanics, Waves and Oscillations-Practical	2	1

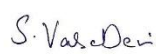
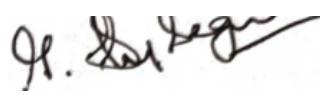
Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
	VI	14 A	Analog and Digital Electronics	3	3
			Analog and Digital Electronics-Practical	2	1
		OR			
		14 B	Vacuum Technology	3	3
			Vacuum Technology-Practical	2	1
		OR			
		14 C	Characterization of Nano Materials	3	3
			Characterization of Nano Materials-Practical	2	1
		OR			
		14 D	Energy Storage and Conversion Systems	3	3
			Energy Storage and Conversion Systems-Practical	2	1
		OR			
		14 E	Computations in Optics, Heat and Thermodynamics	3	3
			Computations in Optics, Heat and Thermodynamics-Practical	2	1
		15 A	Electronic Communication Systems	3	3
			Electronic Communication Systems-Practical	2	1
		OR			
		15 B	Materials for Industrial Applications	3	3
			Materials for Industrial Applications-Practical	2	1
		OR			
		15 C	Applications of Nanomaterials	3	3
			Applications of Nanomaterials-Practical	2	1
		OR			
		15 D	Biomass and Hydrogen Energy	3	3
			Biomass and Hydrogen Energy-Practical	2	1
		OR			
		15 E	Computations in Electricity, Magnetism, Electromagnetic Theory and Modern Physics	3	3
			Computations in Electricity, Magnetism, Electromagnetic Theory and Modern Physics-Practical	2	1

RESOLUTIONS

Minutes of the Meeting

The Board of Studies in Physics met on 08-12-2025 discussed and finalized the syllabus under Cluster University prepared based on Common Core Syllabus framed by APSCHE, Vijayawada and unanimously approved the following academic proposals to be implemented from the Academic Year 2025-2026:

- Syllabi of BSc I and II Semesters (Physics Major) for the academic years 2025-2026 under Cluster University keeping in view the objectives of the university, interest of the stake holders and national requirement for consideration and approval of the Academic Senate. The Detailed course structure of all the semester and the theory and practical syllabus are given in **Annexure-I**
- Panel of names to the Academic Senate for appointment of Papers Setters and Examiners given in **Annexure -VI**.
- Question Pattern and Model Question Paper in **Annexure-III**

S.No	Name of the Faculty	Designation	Name of the College	Signature
1.	Dr. Mohammed Waaiz	Chairman	Dept. of Physics, Silver Jubilee Govt. College, Kurnool-518002, A.P Mobile:9849793821 Email: mdwaaizphysics@gmail.com	
2.	Prof. C.V.Krishna Reddy	University Nominee	Dept. of Physics, Rayalaseema University, Kurnool- 518 007, A.P. Mobile: 9989642920 Email: reddyckv02@yahoo.co.in	
3.	Smt S.Vasavi Devi	Subject Expert	Dept. of Physics, KVR Govt. Degree College for Women, Kurnool-518002. AP Mobile: 9515507034 Email: s.vasavidevi@gmail.com	
4.	Dr M Shanawaz Begum	Subject Expert	Dept. of Physics, Silver Jubilee Govt. College, Kurnool-518002, A.P Mobile: 9849863201 Email: drshanawazbegum@gmail.com	

ANNEXURE - I
COURSE 1: INTRODUCTION TO MATHEMATICAL PHYSICS

Theory

Credits: 3

3 hrs/week

COURSE OBJECTIVE:

To equip students with foundational mathematical techniques—such as vector calculus, linear algebra, complex numbers, probability, and Fourier analysis—essential for understanding and solving problems in physics.

LEARNING OUTCOMES:

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

1. Apply concepts of vector differentiation and integration to analyze physical fields and prove integral theorems.
2. Use matrix operations and eigenvalue techniques to solve linear systems in physics.
3. Represent and manipulate complex numbers in various forms for solving AC circuit problems.
4. Interpret and apply basic probability concepts and distributions to model physical phenomena.
5. Analyze periodic signals using Fourier series and evaluate Fourier coefficients for common waveforms.

UNIT-I - VECTOR ANALYSIS

(9. Hrs.)

Distinction between Ordinary and partial derivatives, Scalar and vector fields, gradient of a scalar field and its physical significance. Divergence and curl of a vector field with derivations and physical interpretation and **problems**. Vector integration (line, surface and volume), Statement and proof of Gauss and Stokes theorems.

UNIT-II – LINEAR ALGEBRA

(9. Hrs.)

~~Vector and Scalar quantities in Physics~~, Matrices and Operations: Types, Addition and Multiplication, Identity, Determinant and Inverse (**problems of 2 x 2 and 3 x 3 matrices only**), Trace, Transpose, Eigenvalues and Eigen Vectors, Calculation of Eigen values using characteristic equations. System of Linear Equations: Solving 2-variable system using matrices and **problems**, Simple examples from physics (Current, forces)

UNIT – III COMPLEX NUMBERS

(9. Hrs.)

Basic Complex numbers: Real and imaginary parts, Conjugate of complex numbers, Modulus and argument (magnitude and phase), Polar and Exponential (Euler) form of complex numbers, **Euler's formula**, Addition and subtraction of complex numbers, Multiplication and division of complex numbers. Phasor representation: representation of voltage and current as phasors, **Derivation of Admittance of a parallel resonant LCR circuit**.

UNIT – IV PROBABILITY

(9. Hrs.)

Probability Theory Basics, Sample space **and types**, Events, Independence and mutual exclusivity, conditional probability, and Bayes' theorem. Random Variables and Probability Distributions, Concept of random variables (discrete and continuous). Common distributions and their applications: Binomial, Poisson, and Gaussian.

UNIT- V FOURIER ANALYSIS

(9. Hrs.)

Introduction to periodic functions: Concept of periodicity (waves, oscillations, AC current), Graphical understanding of Sine and Cosine functions, Need for Fourier analysis, Real world signals (heartbeat, electrical signal, musical tones), Fourier theorem and evaluation of Fourier coefficients, **Fourier series-even and odd functions** ,Analysis of periodic wave functions – Square wave and saw tooth wave ~~and triangular wave.~~

Reference books

1. Mathematical methods for physics sciences (3rd edition) - Mary. L. Boas
2. First Chapter (Vector analysis) in Introduction to Electrodynamics (3rd edition) – David. J. Griffiths
3. Mathematical Methods for Physicists: Arfken, Weber, 2005, Harris, Elsevier

Student Activities:

- Problem-solving sessions using real-life physics applications (e.g., using vector calculus in electromagnetism).
- Group projects on solving physical systems using matrix methods and linear algebra tools.
- Mini-lab activity on phasor diagrams and impedance using circuit simulation software (like LTspice or Tinkercad Circuits).
- Data collection and analysis task: Record physical measurements (e.g., decay times, counts) and apply statistical models (Poisson/Gaussian).

COURSE 1: INTRODUCTION TO MATHEMATICAL PHYSICS

Practical

Credits: 1

2 hrs/week

COURSE OBJECTIVE:

To develop foundational computational and analytical skills through hands-on exercises that prepare students for understanding and solving problems in various realms of physics.

LEARNING OUTCOMES:

1. Graphing and Visualization:
Students will be able to plot mathematical functions and visualize physical phenomena using Excel, Python, or MATLAB.
2. Vector and Matrix Computations:
Students will perform operations on vectors and matrices and represent them both analytically and graphically.
3. Numerical Methods:
Students will apply numerical techniques like Newton-Raphson, Bisection, and Euler's method to solve equations and differential equations.
4. Data Analysis and Fitting:
Students will analyze experimental data using tools like least squares fitting and compute statistical quantities such as mean, standard deviation, and error.
5. Fourier and Complex Number Representation:
Students will approximate functions using Fourier series and graphically represent complex numbers.

List of Practical

Minimum of 6 experiments to be conducted and recorded

1. Graphing standard functions: $\sin(x)$, $\cos(x)$, e^x , $\ln(x)$, x^2 , $\sqrt{x}$ etc. using Excel
2. Experimental determination and vector diagram verification of vector addition and scalar product using graphical methods.
3. Using MATLAB/Python to visualize vector fields and compute gradient, divergence, and curl.
4. Solve simple non-linear equations (e.g., $x^3 - x - 1 = 0$) using graphical methods and bisection/newton-raphson method (Excel).
5. Fit experimental data (e.g., Hooke's law) to a straight line using least squares method in Excel or Python.
6. Linear equation Solution and System of linear equation solution using MATLAB /OCTAVE
7. Fourier approximation of a square wave up to 5 terms using Python/MATLAB and plotting the result.
8. Numerical solution of $dy/dx = x + y$, given initial condition using Euler's method.

9. Single coin tossing and four coin tossing using MATLAB/OCTAVE and verification of statistical laws
10. Use Python/Excel to perform addition, multiplication, and finding inverse of 2x2 and 3x3 matrices.
11. Simulate and plot s-t, v-t graphs using $s=ut+0.5gt^2$ using Excel or Python.
12. Calculate mean, standard deviation, and percentage error for a given data set using Excel/Python/Manual calculations
13. Represent the given complex numbers on graph paper
14. Determine the Eigen Values of the given matrix using characteristic equation

COURSE 2: MECHANICS AND PROPERTIES OF MATTER

Theory

Credits: 3

3 hrs/week

COURSE OBJECTIVE:

To provide students with a foundational understanding of classical mechanics and the physical properties of matter, including particle dynamics, central forces, elasticity, fluid behavior, and the basic principles of special relativity.

LEARNING OUTCOMES: After successful completion of the course, students will be able to:

1. Apply Newton's laws to variable mass systems and analyze particle collisions using conservation laws and scattering theory.
2. Describe motion under central forces and derive orbital dynamics including Kepler's laws and satellite motion.
3. Explain elastic behavior of materials using stress-strain relations, and analyze the bending of beams and torsional motion.
4. Interpret fluid dynamics concepts such as streamline flow, Bernoulli's principle, and viscosity with practical applications.
5. Understand the key postulates of special relativity and apply Lorentz transformations to problems involving time dilation, length contraction, and mass-energy equivalence.

UNIT-I MECHANICS OF PARTICLES

(9 hrs.)

Newton's Laws of motion, motion of variable mass system, Equation of motion of a rocket. Conservation of energy and momentum, collisions in two and three dimensions, concept of impact parameter, scattering cross-section, Rutherford scattering-derivation

UNIT-II CENTRAL FORCES

(9 hrs.)

Central forces, definition and examples, characteristics of central forces, conservative nature of central forces, conservative force as a negative gradient of potential energy, equations of motion under a central force, derivation of Kepler's laws, motion of satellites, Geo-stationary satellites

UNIT III: ELASTICITY AND BENDING OF BEAMS

(9 hrs)

Stress and strain, Hooke's Law, Elastic moduli – Young's, bulk, and shear modulus, Poisson's ratio – Physical meaning, **Behaviour of wire under load**, Bending of beams – Types, **Types of support, Types of Load**, point and distributed load, Cantilever and uniform bending – Qualitative treatment, Torsional pendulum – **theory**, working principle and **determination of rigidity modulus of a wire, uses.**

UNIT IV: FLUID MECHANICS

(9 hrs)

Fluids – Properties and classification, Streamline vs turbulent flow, Reynolds number, Bernoulli's theorem – Statement, simple derivation and applications (Venturimeter, airplane lift), Equation of continuity – Concept, Viscosity – Poiseuille's law (statement and qualitative explanation), Surface tension – Examples and qualitative ideas

UNIT V: SPECIAL THEORY OF RELATIVITY

(9 hrs.)

Galilean Transformations, absolute frames, Michelson-Morley experiment, negative result, postulates of special theory of relativity, Lorentz transformation, time dilation, length contraction, addition of velocities, mass-energy relation

REFERENCE BOOKS:

1. BSc Physics -Telugu Akademy, Hyderabad
2. Mechanics - D.S. Mathur, Sulthan Chand & Co, New Delhi
3. Mechanics - J.C. Upadhyaya, Ramprasad & Co., Agra
4. Properties of Matter - D.S. Mathur, S. Chand & Co, New Delhi ,11th Edn., 2000
5. Physics Vol. I - Resnick-Halliday-Krane ,Wiley, 2001
6. Properties of Matter – Brijlal & Subrmanyam, S. Chand & Co. 1982
7. Mechanics-EM Purcell, Mc Graw Hill
8. University Physics-FW Sears, MW Zemansky & HD Young, Narosa Publications, Delhi
9. College Physics-I. T. Bhima sankaram and G. Prasad. Himalaya Publishing House.
10. Mechanics, S. G. Venkata chalapathy, Margham Publication, 2003.
11. Fluid Mechanics – Frank M. White, McGraw Hill.
12. Textbook of Fluid Dynamics – M. D. Raisinghania, S. Chand & Co.

COURSE 2: MECHANICS AND PROPERTIES OF MATTER

Practical

Credits: 1

2 hrs/week

COURSE OBJECTIVE:

To develop practical skills in the use of laboratory equipment and experimental techniques for measuring properties of matter and analyzing mechanical systems.

LEARNING OUTCOMES:

1. **Demonstrate a practical understanding of classical mechanics** by performing experiments on momentum, collisions, and motion under force.
2. **Analyze physical systems involving elasticity, fluid flow, and torsion** through hands-on measurements and data interpretation.
3. **Apply fundamental physics principles** to explain satellite motion, scattering phenomena, and beam bending using experiments and simulations.
4. **Use scientific simulations and digital tools** to visualize and investigate abstract concepts such as rocket motion, central forces, and relativity.
5. **Develop experimental, observational, and analytical skills** including data recording, graph plotting, and error estimation in real and virtual environments.

Minimum of 6 experiments to be conducted and recorded

1. Young's modulus by uniform bending
2. Young's modulus by non-uniform bending
3. Rigidity modulus using torsional pendulum
4. Surface tension by capillary rise method
5. Flywheel – Determination of moment of inertia
6. Bifilar suspension – moment of inertia of a rectangular body
7. Radius of capillary tube by Hg thread method
8. Simulation of rocket motion using water rocket or computer simulation.
9. **Determination of coefficient of Viscosity by Poiseuille's method.**
10. Simulation-based study of Rutherford scattering.
11. Determination of modulus of rigidity using Maxwell's needle.
12. Measurement of Poisson's ratio of a rubber tube.
13. Verification of Bernoulli's theorem using a horizontal tube setup.
14. Demonstration of lift on an airfoil using airflow setup.

15. Simulation of Michelson-Morley experiment.

16. Visualization of time dilation and length contraction using simulation.

STUDENT ACTIVITIES Unit I: Mechanics of Particles

Activity: Collision Experiments

Students can set up simple collision experiments using marbles, carts, or other objects. They can measure the initial and final velocities, masses, and analyze the momentum conservation. By varying the conditions (e.g., masses, initial velocities), they can observe the effects on the collision outcomes.

Unit II: Central Forces

Activity: Pendulum Motion Students can investigate the motion of a simple pendulum by varying its length and measuring the time period. They can analyze the relationship between the period and the length, and discuss the concept of centripetal force and its role in circular motion.

Unit III: Elasticity and Bending of Beams

Activity: Beam Bending Experiment

Use rulers or meter sticks on supports to apply loads and measure deflection. This hands-on demo helps visualize how elasticity and loading affect real-world structures.

Unit IV: Lagrangian Mechanics

Activity: Apply Lagrangian mechanics to various physical systems

Unit V: Special Theory of Relativity

Activity: Time Measurement Students can perform a time measurement experiment using simple devices like water clocks or sand timers. They can compare the measured time between two events at different relative speeds and discuss the concept of time

ANNEXURE - II
SEMESTER-II

COURSE 3: WAVES AND OPTICS

Theory

Credits: 3

3 hrs/week

COURSE OBJECTIVE:

The course aims to develop a foundational understanding of oscillatory motion, wave behavior in strings and bars, and optical phenomena like interference, diffraction, and polarization. Students will learn to mathematically analyze vibrations and light behavior through theoretical and experimental approaches.

LEARNING OUTCOMES:

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

1. Describe the basic characteristics of waves such as frequency, wavelength, amplitude, period, and speed and utilize mathematical relationships related to wave characteristics.
2. Distinguish between Longitudinal and Transverse waves.
3. Understand the phenomenon of interference of light and its formation in Thin films and Newton's rings.
4. Distinguish between Fresnel's diffraction and Fraunhofer diffraction and observe the diffraction patterns in the case of single slit and the diffraction grating and to describe the construction and working of zone plate and make the comparison of zone plate with convex lens
5. Explain the various methods of production of plane, circularly and polarized light and their detection and the concept of optical activity.

UNIT-I: SIMPLE HARMONIC, DAMPED & FORCED OSCILLATIONS (9 Hrs.)

Simple Harmonic Oscillator: Solution of differential equation, and physical characteristics, Principle of superposition, Combination of two mutually perpendicular SHMs (1:1 and 1:2 frequencies), Lissajous figures - **Uses**. Damping, Damped Harmonic Oscillator: Solution of differential equation, Energy considerations, Logarithmic decrement, relaxation time, quality factor, Forced Oscillations: Solution of differential equation.

UNIT-II VIBRATING STRINGS AND BARS (9 Hrs.)

Transverse wave propagation along a stretched string, general solution of wave equation and its significance, modes of vibration of stretched string clamped at ends, overtones and harmonics. ~~Energy transport and transverse impedance~~. Longitudinal vibrations in bars-wave equation and its general solution. Special cases (i) bar fixed at both ends (ii) bar fixed at the midpoint (iii) bar fixed at one end (Any two special cases). Tuning fork and uses

UNIT-III: INTERFERENCE

(9 hrs)

Principle of superposition – coherence Conditions for interference of light. Fresnel's biprism determination of wavelength of light, change of phase on reflection, Oblique incidence of a plane wave on a thin film due to reflected light (cosine law) –colors of thin films- Interference by a film with two non-parallel reflecting surfaces (Wedge shaped film). Determination of diameter of wire, Newton's rings in reflected light. Determination of wavelength of monochromatic light using Newton's rings.

UNIT-IV: DIFFRACTION

(9 hrs.)

Introduction, distinction between Fresnel and Fraunhofer diffraction, Fraunhofer diffraction – Diffraction due to single slit, Fraunhofer diffraction pattern with N slits (diffraction grating), Resolving power of grating, Determination of wavelength of light in normal incidence using diffraction grating. Fresnel's half period zones-area of the half period zones-zone plate, Difference between interference and diffraction.

UNIT-V: POLARIZATION

(9 hrs.)

Polarized light: ~~methods of polarization by reflection, refraction, double refraction~~, Brewster's law, Malus law, Nicol prism polarizer and analyzer, Quarter wave plate, Half wave plate, optical activity - Determination of specific rotation by Laurent's half shade Polarimeter. Elliptical and circular polarization **and its mathematical analysis.**

REFERENCE BOOKS:

1. BSc Physics Vol.1, Telugu Academy, Hyderabad.
2. BSc Physics Vol.2, Telugu Akademy, Hyderabad
3. Fundamentals of Physics. Halliday/Resnick/Walker, Wiley India Edition 2007.
4. Waves & Oscillations. S. Badami, V. Balasubramanian and K.R. Reddy, Orient Longman.
5. College Physics-I. T. Bhimasankaram and G. Prasad. Himalaya Publishing House.
6. Optics – Ajoy Ghatak, Tata McGraw Hill
7. Fundamentals of Optics – Jenkins and White, McGraw Hill
8. Wave Optics and Vibrations – N. Subrahmanyam & Brijlal, S. Chand & Co.
9. Vibrations and Waves – H. J. Pain, Wiley

SEMESTER-II

COURSE 3: WAVES AND OPTICS

Practical

Credits: 1

2 hrs/week

COURSE OBJECTIVE:

The Course Objective for a practical course in electricity and magnetism may include to develop practical skills in handling electrical and electronic components, such as resistors, capacitors, inductors, transformers, and oscillators.

LEARNING OUTCOMES:

1. Determine fundamental mechanical quantities like acceleration due to gravity and spring constant using compound pendulum and spring-based experiments, applying principles of oscillatory motion.
2. Apply statistical methods to analyze experimental data, estimate errors, and understand the importance of precision in repeated time-period measurements using a simple pendulum.
3. Explore wave phenomena through sonometer experiments, verifying laws of vibrations in stretched strings, and understand the relationship between frequency, tension, and length.
4. Analyze interference patterns in Newton's rings and wedge method to determine lens curvature and wire thickness, demonstrating coherence and phase concepts in light.
5. Examine diffraction effects using grating and prisms to determine wavelength and dispersive power, and assess optical resolving capabilities of telescopes and gratings.
6. Investigate polarization phenomena through polarimetry and understand optical activity by determining specific rotation of optically active substances.

Minimum of 6 experiments to be conducted and recorded

1. Determination of 'g' by compound/bar pendulum
2. Simple pendulum normal distribution of errors-estimation of time period and the error of the mean by statistical analysis.
3. Solving equation of motion for DHO & FHO using MATLAB/OCTAVE/Python
4. Determination of the force constant of a spring by static and dynamic method.
5. Verification of laws of vibrations of stretched string –sonometer.
6. Determination of radius of curvature of a given convex lens-Newton's rings.
7. Resolving power of grating.
8. Study of optical rotation – polarimeter.
9. Fourier transform simulation of single slit diffraction
10. Fourier transform simulation of diffraction at circular, rectangular aperture, edge
11. Dispersive power of a prism.

12. Determination of wavelength of light using diffraction grating-normal incidence method.
13. Determination of wavelength of laser light using diffraction grating.
14. Resolving power of a telescope.
15. Refractive index of a liquid-hallow prism.
16. Determination of thickness of a thin wire by wedge method.

STUDENT ACTIVITIES

UNIT-I: SIMPLE HARMONIC, DAMPED & FORCED OSCILLATIONS

Activity: Measuring the period of a simple pendulum and verifying the relationship between the period and the length of the pendulum. Students can use a stopwatch and a ruler to measure the time for a fixed number of oscillations and calculate the period.

Activity: Measuring the damping coefficient of a mass-spring system and calculating the quality factor. Students can measure the amplitude of the system as it undergoes damped oscillations and use the logarithmic decrement formula to calculate the damping coefficient.

UNIT-II VIBRATING STRINGS AND BARS

Activity: Measuring the speed of sound in a metal rod and comparing it with the theoretical value. Students can use a microphone and an oscilloscope to measure the time delay between two reflections of a sound pulse in the rod. They can then use the formula for the speed of sound in a solid to calculate the speed and compare it with the theoretical value

UNIT-III: INTERFERENCE

Ask students to measure the diameter of the central bright spot and the diameter of the n th ring for different values of n , and then calculate the wavelength of light

UNIT-IV: DIFFRACTION

Build a simple diffraction grating using a piece of cardboard and some sewing needles. Ask students to measure the distance between the needles, count the number of lines per unit length, and then calculate the grating spacing and the wavelength of light.

UNIT-V: POLARIZATION

Ask students to measure the angle of rotation of the polarized light before and after passing through the sample, and then calculate the specific rotation of the sample.

SEMESTER-II

COURSE 4: HEAT AND THERMODYNAMICS

Theory

Credits: 3

3 hrs/week

COURSE OBJECTIVE:

The course on Heat and Thermodynamics aims to provide students with a fundamental understanding of the principles of heat and energy transfer and their applications in various fields

LEARNING OUTCOMES:

On successful completion of this course, the student will be able to:

1. Understand the basic aspects of kinetic theory of gases, Maxwell-Boltzmann distribution law, equipartition of energies, mean free path of molecular collisions and the transport phenomenon in ideal gases
2. Gain knowledge on the basic concepts of thermodynamics, the first and the second law of thermodynamics, the basic principles of refrigeration, the concept of entropy, the thermodynamic potentials and their physical interpretations. Understand the working of Carnot's ideal heat engine, Carnot cycle and its efficiency
3. Develop critical understanding of concept of Thermodynamic potentials, the formulation of Maxwell's equations and its applications.
4. Differentiate between principles and methods to produce low temperature, liquefy air, and understand the practical applications of substances at low temperatures.
5. Examine the nature of black body radiations and the basic theories.

UNIT-I: KINETIC THEORY OF GASES

(9 hrs)

Kinetic Theory of gases- Introduction, Maxwell's law of distribution of molecular velocities, Lammert's toothed wheel method; Mean free path, ~~Principle of equipartition of energy~~, Transport phenomenon in ideal gases: viscosity and Thermal conductivity & Diffusion.

UNIT-II: THERMODYNAMICS

(9 hrs)

Introduction- Reversible and irreversible processes, Carnot's engine and its efficiency, Carnot's theorem, ~~Thermodynamic scale of temperature~~, Second law of thermodynamics Entropy: Physical significance, Change in entropy in reversible and irreversible processes; Change of entropy when ice changes into steam. Temperature-Entropy (T-S) diagram and its uses.

UNIT-III: THERMODYNAMIC POTENTIALS AND MAXWELL'S EQUATIONS (9 hrs)

Thermodynamic Potentials-Internal Energy, Enthalpy, Helmholtz Free Energy, Gibb's Free Energy and their significance, Derivation of Maxwell's thermodynamic relations from thermodynamic potentials, ~~Applications of Maxwells Relations~~ 1. Clausius-Clayperon's equation, – 2. Difference of two Specific heats 3. Ratio of two Specific Heats. ~~Joule-Kelvin-coefficient for ideal and Van-der-Waals' gases.~~

UNIT IV: LOW TEMPERATURE PHYSICS

(9 hrs)

Methods for producing very low temperatures, Critical temperature, Inversion temperature, Joule Kelvin effect, Porous plug experiment, **Joule-expansion**, Distinction between **Joule expansion**, adiabatic and Joule Thomson expansion, Expression for Joule Thomson cooling, Production of low temperatures by adiabatic demagnetization (qualitative), Refrigeration – Vapour compression machine.

UNIT-V: QUANTUM THEORY OF RADIATION

(9 hrs)

Black body, Ferry's black body, Spectral energy distribution of black body radiation, Wein's displacement law and Rayleigh- Jean's law (No derivations), Planck's law of black body radiation-Derivation, Deduction of Wein's law and Rayleigh- Jean's law from Planck's law, Solar constant and its determination using Angstrom pyro heliometer, Estimation of surface temperature of Sun.

REFERENCE BOOKS

1. BSc Physics, Vol.2, Telugu Academy, Hyderabad
2. Thermodynamics, R.C. Srivastava, S.K. Saha & Abhay K. Jain, Eastern Economy Edition.
3. Unified Physics Vol.2, Optics & Thermodynamics, Jai Prakash Nath & Co. Ltd., Meerut
4. Fundamentals of Physics. Halliday/Resnick/Walker. C. Wiley India Edition, 2007
5. Heat and Thermodynamics - N BrijLal, P. Subrahmanyam, S. Chand & Co., 2012
6. Heat and Thermodynamics - MS Yadav, Anmol Publications Pvt. Ltd, 2000
7. University Physics, HD Young, MW Zemansky, FW Sears, Narosa Publishers, New Delhi

SEMESTER-II

COURSE 4: HEAT AND THERMODYNAMICS

Practical

Credits: 1

2 hrs/week

COURSE OBJECTIVE:

The objectives for practical's in Heat and Thermodynamics can vary depending on the specific course or program, but here are some general objectives that may apply, to develop practical skills in the use of laboratory equipment and experimental techniques for studying heat and thermodynamics.

LEARNING OUTCOMES:

1. Mastery of experimental techniques: Students should become proficient in using laboratory equipment and experimental techniques for studying heat and thermodynamics.
2. Application of theory to practice: Students should be able to apply theoretical concepts learned in lectures to real-world situations, and understand the limitations of theoretical models.
3. Accurate recording and analysis of data: Students should be able to accurately record and analyze experimental data, including understanding the significance of error analysis and statistical methods.
4. Critical thinking and problem solving: Students should be able to identify sources of error, troubleshoot experimental problems, and develop critical thinking skills in experimental design and analysis.
5. Understanding of physical principles: Students should develop an understanding of the physical principles governing heat and thermodynamics, including the laws of thermodynamics, heat transfer, and thermodynamic cycles.

Minimum of 6 experiments to be done and recorded

1. Specific heat of a liquid – Joule's calorimeter –Barton's radiation correction
2. Thermal conductivity of bad conductor - Lee's method
3. Thermal conductivity of rubber.
4. Measurement of Stefan's constant.
5. Specific heat of a liquid by applying Newton's law of cooling correction.
6. Heating efficiency of electrical kettle with varying voltages.
7. Thermo emf- thermo couple - Potentiometer
8. Thermal behavior of an electric bulb (filament/torch light bulb)
9. Study of variation of resistance with temperature - Thermistor.
10. Thermal expansion of solids using metal ball and a ring.

STUDENT ACTIVITIES

Unit I: Kinetic Theory of Gases

Activity: Speed Distribution Analysis

Students can conduct a simple experiment using gas molecules (e.g., small balls) in a container. They can measure the speeds of the molecules using a motion sensor or stopwatch and analyze the distribution of molecular velocities. They can compare the observed distribution with the expected Maxwell's law of distribution.

Unit II: Thermodynamics

Activity: Heat Engine Efficiency Calculation

Students can work in groups to design a simple heat engine (e.g., using a syringe and a small turbine). They can measure the temperature changes and calculate the efficiency of their engine. They can compare their calculated efficiency with the theoretical Carnot efficiency to understand the limitations of real heat engines.

Unit III: Thermodynamic Potentials and Maxwell's Equations

Activity: Thermodynamic Relations Verification

Students can solve numerical problems involving different thermodynamic potentials (internal energy, enthalpy, Helmholtz free energy, and Gibbs free energy) and verify the Maxwell's thermodynamic relations. They can compare the calculated values using different relations to ensure consistency.

Unit IV: Low Temperature Physics

Activity: Adiabatic Demagnetization Experiment

They can discuss the distinction between adiabatic and Joule-Thomson expansions.

Unit V: Quantum Theory of Radiation

Activity: Black Body Radiation Spectrum Analysis

They can estimate the surface temperature of the Sun using the solar constant and Angstrom pyro heliometer data.

ANNEXURE - II

Justification Proforma for Amendments in the syllabus for Semester I & II 2025-26

S.No.	Semester	Paper	Title of the Paper	Major Additions/Deletions	Justification
1	I	Course-1	Introduction to Mathematical Physics	Unit-1 Addition: Problems on Divergence and Curl of a Vector field	The topic is added to understand the concepts.
2				Unit-2 Deletion: Vector & Scalar quantities in Physics. Addition: Hermitian matrices, & Skew Hermitian matrices. Problems	The topic is deleted as the topic is already read. Concepts are important.
3				Unit-3 Addition: Euler's formula,	Euler's formula is added for competitive exams
4				Unit-5 Addition: Fourier series-even & odd functions	When these two series are added, they reconstruct the complete original signal in Fourier analysis.
5.	I	Course-2	Mechanics & properties of matter	Unit-3 Addition: Torsional Pendulum-Theory, determination of rigidity modulus of a wire	To study the applications of torsional pendulum
				Unit-5 Addition: Four vector formalism	It provides a Mathematically consistent invariant way to represent space-time & physical quantities.

Justification Proforma for Amendments in the syllabus for Semester II 2025-26

S.No.	Semester	Paper	Title of the Paper	Major Additions/Deletions		Justification
1	II	Course 3	Waves and Optics	Unit-I	Addition: Uses of Lissajous figures	To enable the students, learn the area of its application
				Unit -II	Deletion: Modes of vibration of stretched string clamped at ends, overtones and Harmonics	The topic is already dealt with in Intermediate
2	II	Course 4	Heat and Thermodynamics	Unit-I	Addition : Diffusion	Diffusion is one of the transport phenomena
					Deletion: Principle of equipartition of Energy	Students have already studied that topic in Intermediate
				Unit-III	Addition: Applications of Maxwells equations Ratio of Specific Heats and Ratio of Specific Heats	knowledge on Application is needed
					Deletion :Joule-Kelvin coefficient for ideal and Vander Waals gases	The same Topic is repeated in Unit IV
				Unit IV	Addition : Difference between Joule Expansion, Joule Thomson expansion and Adiabatic expansion Deletion : Joule expansion as independent Topic	Reframing of the concept .

ANNEXURE - III

CLUSTER UNIVERSITY: KURNOOL

DEPARTMENT OF PHYSICS

I B.Sc. Physics W.e.f.2025-2026

SEMESTER-I

Course-1: INTRODUCTION TO MATHEMATICAL PHYSICS

MODEL QUESTION PAPER

Time:3hrs

Max.Marks:70

SECTION-A

Answer any FIVE of the following Questions

5x4M=20M

1. Differentiate between ordinary derivatives and partial derivatives with examples.
2. Find the value of constant c for which the vector $A = i(x+3y) + j(y-2z) + k(x+cz)$ is solenoidal.
3. Define the identity and inverse of a matrix. Under what condition does the inverse of a matrix exist?
4. Find the determinant of the following 2×2 matrix $A = \begin{bmatrix} 4 & 3 \\ 2 & 1 \end{bmatrix}$
5. Define the conjugate and modulus of a complex number $z = a + ib$.
6. Define conditional probability and write its formula. Give an example to illustrate its use.
7. What are Random variables? Explain.
8. Define a periodic function. Give two examples from real-world phenomena that exhibit periodicity.

Note: Two questions from each unit-I, II, IV and One from each Unit-III & V

Section-B

Answer ALL Questions

5x10M=50M

- 9.(a) Explain in detail the concept of divergence of a vector field. Derive an expression and discuss physical interpretations with suitable examples.

OR

- (b) State and prove Gauss's Divergence Theorem. Discuss their significance in vector integration.

- 10.(a) Explain the method of solving a system of two linear equations using matrices. Illustrate with a simple example from physics, such as finding current in a two-loop electrical network.

OR

- (b) What are Eigenvalues and Eigenvectors. How do you find them using the characteristic equation?

11.(a) Derive expressions for addition, subtraction, multiplication, and division of complex numbers in polar form.

OR

(b) Derive an expression for the impedance and phase angle of a series LCR circuit.

12.(a) State and prove Bayes' Theorem. Discuss its significance.

OR

(b) Explain the Poisson distribution and its applications.

13.(a) Analyse the Fourier series representations of square waveform.

OR

(b) State Fourier theorem & evaluate Fourier coefficients. What are its limitations?

Note: (Set One question from each Unit-I, II, III, IV, V with internal choice.)

CLUSTER UNIVERSITY: KURNOOL

MODEL QUESTION PAPER

Course 2: Mechanics and Properties of matter

(w.e.f. 2025-26)

Semester – I

Time: 3 Hrs

Max. Marks: 70M

PART-A

I. Answer FIVE questions. Each question carries 4 marks.

5QX 4M = 20M.

1. The maximum and minimum distances of a comet from the sun are $1.6 \times 10^{10} \text{m}$ and $8 \times 10^{10} \text{m}$ respectively. If the speed of comet at the nearest point is $6 \times 10^4 \text{ m/s}$ calculate the speed at the farthest point.
2. Define Collision. Distinguish between elastic and inelastic collisions.
3. Define central force and write its characteristics.
4. Discuss briefly motion of satellites and Geostationary satellite.
5. Explain different types of bending in beams.
6. Define the terms i) Stress ii) Strain iii) Hooks law iv) Poisson's Ratio.
7. State and explain Poiseuille's law in Viscosity.
8. Deduce Einsteins Mass Energy Relation.

(Two questions from each Unit I, II, III and One from each unit IV & V)

PART-B

II. Answer ALL questions. Each question carries 10 marks.

5QX10M = 50M

- 9.(a) Discuss the motion of Variable mass system. Derive an expression for final velocity of Rocket.

OR

- (b) Define the terms impact parameter and Scattering angle in Rutherford's scattering and derive the relation between them?

- 10.(a) Define Conservative force and Show that the central force is conservative.

OR

- (b) State Kepler's laws. Deduce Kepler's first law.

11.(a) Define the three elastic moduli and derive the relation between them.

OR

(b) Explain the working principle of torsional pendulum . What are its uses.

12.(a) Discuss the classification of fluids based on their properties. Water flows through a pipe with an internal diameter of 2cm at a velocity of 1m/s.The pipe is connected to a nozzle with a smaller diameter. What is the diameter of nozzle if the water exits at a speed of 4m/s?

OR

(b) State and prove Bernoulli's Principle. Explain one application.

13. (a) Describe Michelson's Morley Experiment. What is the significance of the experiment?

OR

(b) State the postulates of special theory of relativity. Derive Lorentz transformation equations.

(Set ONE question from each Unit-I, II, III ,IV, V with internal choice)

CLUSTER UNIVERSITY: KURNOOL

MODEL QUESTION PAPER

WAVES AND OPTICS

(w.e.f. 2025-26)

Semester – II

Time: 3 Hrs

Max. Marks: 70M

PART-A

Answer FIVE questions. Each question carries 4 marks.

5QX 4M = 20M.

1. Explain physical characteristics of simple harmonic motion.
2. Explain logarithmic decrement and relaxation time of Damped Harmonic Oscillator.
3. Write a short note on Tuning Fork.
4. Explain the conditions for Interference of light.
5. Discuss colors in thin films.
6. Write the differences between two classes of Diffraction.
7. What are Fresnel's half period zones?
8. State and explain Malus law.

(Two questions from each Unit I,III, IV and One from each unit II &V)

PART-B

Answer ALL questions. Each question carries 10 marks.

5QX10M = 50M

- 9.(a) What are Lissajous figures. Discuss the combination of two simple Harmonic oscillations of same frequency acting at right angles to each other
OR
(b) Form the equation for Forced Harmonic Motion and obtain its solution.
- 10.(a) Obtain the equation for the velocity of transverse wave in a stretched string and obtain the solution of wave equation.
OR
(b) Derive longitudinal wave equation in a bar and discuss its solution.
- 11.(a) With a neat diagram describe the experimental determination of wavelength of monochromatic light using Fresnel's Biprism.
OR
(b) Explain the experimental set up of Newton's Rings how do you determine the radius of curvature of given Plano convex lens by forming Newton's Rings.

12.(a) Explain with necessary theory diffraction due to single slit.

OR

(b) Describe the experimental determination of wavelengths of different spectral lines using Diffraction grating in normal incidence position.

13. (a) Describe the construction and working of Nicol Prism. What are its uses

OR

(b) Define specific rotation. Explain the experimental determination of specific rotation using Laurent's Half shade Polarimeter

(Set ONE question from each Unit-I, II, III ,IV, V with internal choice)

CLUSTER UNIVERSITY: KURNOOL
DEPARTMENT OF PHYSICS
I B.Sc. Physics W.e.f.2025-2026
SEMESTER-II
Course-4: HEAT AND THERMODYNAMICS
MODEL QUESTION PAPER

Time:3hrs

Max.Marks:70

SECTION-A

Answer any **FIVE** of the following Questions

5x4M=20M

1. Define mean free path of a gas molecule. Obtain an expression for it.
2. State and prove Carnot's theorem.
3. Obtain an expression for change of entropy when ice changes in to steam.
4. Derive an expression for the difference of specific heats of a gas.
5. Distinguish between Joule expansion and Adiabatic expansion and Joule Thomson expansion.
6. Explain the principle of Refrigeration.
7. Discuss the spectral energy distribution of black body.
8. How do you determine temperature of the Sun?

Note: Two questions from each unit-II, IV, V and One from each Unit-I & III

SECTION-B

Answer **ALL** Questions

5x10M=50M

- 9.(a) Derive Maxwell's distribution law of molecular velocities of gases.

OR

- (b) Obtain an expression for the coefficient of viscosity of the gas on the basis of Kinetic theory of gases.

- 10 (a) What is a Carnot's engine? Obtain an expression for efficiency of the engine.

OR

- (b) What is an absolute scale of temperature? Show that this scale agrees with the ideal gas scale. Is a negative temperature possible on this scale?

11. (a) Derive Maxwell's equations using thermodynamic potentials.

OR

- (b) Derive Clausius-Clapeyron's equation. Mention it's applications.

12.(a) Describe the method of production of low temperature using adiabatic demagnetization.

OR

(b) What is Joule-Thomson effect? Obtain an expression for Joule-Thomson cooling.

13.(a) Derive Planck's law of black body radiation. Deduce Wein's law and Rayleigh-Jeans law from Planck's law.

OR

(b) Define Solar constant? Explain how solar constant can be determined using pyrheliometer.

Note: (Set One question from each Unit-I, II, III, IV, V with internal choice.)

ANNEXURE – IV

Practical's Scheme of Valuation

Time: 3hrs

Max.Marks:50M

1. Formulae & Explanation	-	05 Marks
2. Tabular form + graph + circuit diagram	-	10 Marks
3. Observations	-	10 Marks
4. Calculation, Graph, Precaution and Result	-	10 Marks
5. Viva voce	-	05 Marks
6. Records	-	10 Marks

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Total Marks	-	50 Marks
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ANNEXURE-V

INTERNAL ASSESSMENT

Continuous internal assessment is done on a regular basis to know the progress of the students. It facilitates the teacher to take necessary remedial activities for slow learners and to encourage the bright students by giving challenging tasks. Out of 30 marks, 20 marks are allotted for internal assessment exam and 5 marks for assignment, and 5 marks for seminar. Two mid internal objective tests will be conducted either in offline/ online mode and the average will be taken.

For I year students internal assessment will be done for 30 marks

Type of Evaluation	Written exam		Total	Seminar /viva voce	Assignment	Grand Total
	I internal	II internal				
Marks Allotment	20	20	20 (Average of I & II internal exams)	5	5	30

ANNEXURE - VI

CLUSTER UNIVERSITY: KURNOOL

Panel of Examiners & Paper Setters

1. Dr H Sudhakara Rao Lecturer in Physics Govt. College for Men(A) Kadapa 9884770142.	2. Dr A Durga Lakshmi Lecturer in Physics Govt. Degree College, Rajamundry 9491419667
3. Dr J Chandrasekhar Lecturer in Physics SCNR Govt Degree College Proddatur.7382105240	4. Dr.S.Abdul Muneer Lecturer in Physics Osmania College Kurnool Kurnool District.9849747351
5. Sri. G Lakshmi Rangaiah Lecturer in Physics KSN Government Degree College for Women, Anantapur -9440418274	6 Dr K.A Jamal Basha Lecturer in Physics Govt. College for Men(A) Kadapa 9441549098
7. Dr S.Talat Parveen Lecturer in Physics, GDC Nandikotkur Kurnool 9985421907	8. Dr. S. Nisar Ahmed Lecturer in Physics Govt. Degree College Nandikotkur. Kurnool Dist. 9700382288
9. Smt A Sasikala Lecturer in Physics Government Degree College for Men Nandyal	10 Dr. N Lalita Kumari Lecturer in Physics Govt. Degree College Dhone Kurnool District 9490882626
11 Dr.T.Gopal Reddy Lecturer in Physics Balasiva Degree College, Kurnool Kurnool 9440672512	12 Dr G Madhusudhan Lecturer in Physics Govt. Degree College Anantapur. 9515962917
13 Sri N. Uma Maheswara Reddy, Lecturer in Physics, Government Degree College Banganapalle-9885520281	14 Dr D Chandrasekhar Lecturer in Physics SVGM Govt Degree College Kalyandurg, Anantapur Dist 9491546997
15. Dr. Altaf Ahmed Associate Professor of Physics Balasiva Degree College, Kurnool 9440292987	15. Dr. T Firoz Khan Associate Professor of Physics Govt College Anantapur(A) 9441551587