UG PROGRAM (4 Years Honors)
CBCS - 2020-21

B.Sc
PHYSICS

Syllabus and Model Question Papers

TABLE OF CONTENTS

Note: BOS is to providefinal soft copy in PDF and word formats and four copies of hard copies in bounded form to the office of Dean Academic affairs.

1. Resolutions of the Board of Studies

Meeting held on: Dt.22.01.2021…….Time:10.00AM
At: ANUR, Convention Hall, Rjy

Agenda:

1. Adoption of vised-common program structure and revising/updating course-wise syllabi as per guidelines issued by APSHE.
2. Adoption of regulations on scheme of examination and marks/grading system of university UG programme.
3. Preparationof Model Courses in prescribed format.
4. List ofequipment/software requirement for each lab/ practical.
5. Eligiblity of student joining in the course.
6. Eligiblity of faculty for teaching the course.
7. Specific instructions to the teachers/ Course-setters / CS/ Course Evaluator.
8. List of Course-setters/ Course evaluators.

Members present:

1. Dr. K. Srinivas Rao Chairman, VSM College (A), Ramachandrapuram.Ao
2. Dr. S Rajya Laskhmi, Coordinator, ANUR, Rajahmundry.
3. Sri Ch Phani Kumar, Member, Aditya Degree College for Women, Rajamundry.

Resolutions:

1. Resolved to adopt the revised common program structure and verifying course wise syllabus as per guidelines issued by APSHE.
2. Resolved to continue the scheme of examination, pattern of examination external 75Marks and internal assessment 25Marks. However for all Practical LSC and SDC no internal assesment. All practical courses will be conducted for 50Marks and 3 Hrs duration. For evaluation of practical present system is followed.
3. Model Question Courses are prepared as per guidelines given by APSHE.
4. Also resolved to conduct piratical 2hrs per week and 4hrs theory per week. List of practical is revised.
5. Opinion of members taken into consideration for eligibility into course.
6. Resolved teaching staff eligibility as per guidelines.
7. By taking the recommendations of member guidelines are fomulated for question Courses setters and others.
8. List of Course setters is approved by BOS.
9. Panel of examiners is also approved by BOS.

2. DETAILS OF COURSE TITLES & CREDITS

Sem	Course no.	Course Name	Course type (T/L/P)	Hrs./Week (Science: 4+2)	Credits (Science: 4+1)	Max. Marks Cont/ Internal/Mid Assessment	Max. Marks Sem-end Exam
I	1	Mechanics, Waves & Oscillations	T	4	4	25M	75M
	2	Practila course -1	L	2	1	0	50M
II	3	Wave Optics	T	4	4	25M	75M
	4	Practial Course - 2	L	2	1	0	50M
III	5	Heat & Thermodynamic	T	4	4	25M	50M
	6	Practial Course - 3	L	2	1	0	50M
IV IV	7	Electricity, Magnetism & Electronics	T	4	4	25M	50M
	8	Practical Course - 4	L	2	1	0	50M
	9	Modern Physics	T	4	4	25M	50M
	10	Practical Course - 5	L	2	1	0	25M

Note: *Course type code: T: Theory, L: Lab, P: Problem solving

a. Proposed combination subjects:

Physics is one of the subject at Graduation in B.Sc (Mathematics, Physics and Chemistry,B Sc (Mathematics, Physics and Computer Science), B. Sc. (Mathematics, Physics and Electronics, B. Sc. (Mathematics, Physics and Geology), B. Sc. (Geology, Physics and Chemistry).

b. Student eligibility for joining in the course:

PHYSICS is the one of the subject in Intermediate Physics.

c. Faculty eligibility for teaching the course

PG in Physics as per UGC norms.

d. List of Proposed Skill enhancement courses with syllabus, if any --- NO ----

e. Any newly proposed Skill development/Life skill courses with draft syllabus and required resources

---------- NO ----------

f. Required instruments/software/ computers for the course (Lab/Practical course-wise required i.e., for a batch of 15 students)

Sem. No.	Lab/Practical Name	Names of Instruments/Software/ computers required with specifications	Brand Name	Qty Required
1	P. Course 1:	Travelling MicroScope, Fly Wheel, Aspirator bottle, Compound pendulum, Stop Watches, Sono meter, Melde's apparatus, Screw gauge, Tuning forks set	Micron[1], PISCO	Each 5
2	P. Course - 2	Spectrometer, Transmission Grating, Prisim, Polarimeter, Telescope, plane glass plates, sodium vapor lamp, Mercury lamp, Convex lenses and Mercury	Micron, PISCO	Each 5
3.	P.Course - 3	Joules calorimeter, Lees apparatus, Electrical Kettle, Thermocouple, Stefans constant appratus, CarryFosters bridge	Micron, PISCO	Each 5
4.	P. Course - 4	LCR kit, Power supply, Ammeter, Voltmeter, Digital Multi Meter, Stewart & Gee's apparatus, Transister charactersitics kit, Half adder & Full adder kit and barmagnets	Micron, PISCO	Each 5
5.	P. Course - 5	e/m kit, photo cell kit, energy band gap kit, thermister kit, GM Counter with source	Micron, PISCO	

g. List of Suitable levels of positions eligible in the Govt/Pvt organizations

Suitable levels of positions for these graduates either in industry/govt organization like., technical assistants/ scientists/ school teachers., clearly define them, with reliable justification

S.No	Position	Company/ Govt organization	Remarks	Additional skills required, if any
1.	Clerk	IBPS		Skill in functional English, and aptitude.
2.	SSC	Central Govt.		Skill in functional English, and aptitude with GK.
3.	Assit Programmer	MNC (Soft ware Companies)		Skill in functional English, and aptitude and expected domain skills
4.	Technical assistant	Pharma copanies,	Chemistry background student	Along with aptitude and English, domain skills.

h. List of Govt. organizations / Pvt companies for employment opportunities or internships or projects

S.No	Company/ Govt organization	Position type	Level of Position			
1	A V V V Prasad	Managing Director		Solar Systems Kakinada	944o573389	

i. Any specific instructions to the teacher /Course setters/Exam-Chief Superintendent
1. Follow the syllabus prescribed by BoS and see that no deviation.
2. Questions in Course should clear and there should no ambiguity.
3. In Translation into telugu care should be taken, some case question is entirely different in telugu and english.
4. Minimum importance should be given to numerical problemls,
5. Log tables and Calculators may be allowed

3. Program objectives, outcomes, co-curricular and assessment methods

B Sc	PHYSICS

1. Aim and objectives of UG program in Subject:
   To align with emerging and employment areas.
2. Learning outcomes of Subject
   Semester - 1: Mechanics, Waves & Oscillations:

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

- Understand Newton's laws of motion and motion of variable mass system and its application to rocket motion and the concepts of impact parameter, scattering cross section.
- Apply the rotational kinematic relations, the principle and working of gyroscope and itapplications and the processional motion of a freely rotating symmetric top.
- Comprehend the general characteristics of central forces and the application of Kepler's laws to describe the motion of planets and satellite in circular orbit through the study of law of Gravitation.
- Understand postulates of Special theory of relativity and its consequences such as length contraction, time dilation, relativistic mass and mass-energy equivalence.
- Examine phenomena of simple harmonic motionand the distinction between undamped, damped and forced oscillations and the concepts of resonance and quality factor with reference to damped harmonic oscillator.
- Appreciate the formulation of the problem of coupled oscillations and solve them to obtain normal modes of oscillation and their frequencies in simple mechanical systems.
- Figure outthe formation of harmonics and overtones in a stretched string and acquire the knowledge on Ultrasonic waves, their production and detection and their applications in different fields.

Semester - 2: Wave Optics:

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

- Understand the phenomenon of interference of light and its formation in (i) Lloyd's single mirror due to division of wave front and (ii) Thin films, Newton's rings and Michelson interferometer due to division of amplitude.
- Distinguish between Fresnel's diffraction and Fraunhoffer diffraction and observe the diffraction patterns in the case of single slit and the diffraction grating.
- Describe the construction and working of zone plate and make the comparison of zone plate with convex lens.
- Explain the various methods of production of plane, circularly and polarized light and their detection and the concept of optical activity..
- Comprehend the basic principle of laser, the working of He-Ne laser and Ruby lasers and their applications in different fields.3
- Explain about the different aberrations in lenses and discuss the methods of minimizing them.
- Understand the basic principles of fibreoptic communication andexplore the **field of**

Holography and Nonlinear optics and their applications.

Semester - 3 : Heat and Thermodynamics:

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

- Understand the basic aspects of kinetic theory of gases, Maxwell-Boltzman distribution law, equipartition of energies, mean free path of molecular collisions and the transport phenomenon in ideal gases
- Gain knowledge on the basic concepts of thermodynamics, the first and the second lawof 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
- Develop critical understanding of concept of Thermodynamic potentials, the formulation of Maxwell's equations and its applications.
- Differentiate between principles and methods to produce low temperature and liquefyair and also understand the practical applications of substances at low temperatures.
- Examine the nature of black body radiations and the basic theories.

Semester - 4 : Electricity, Magnetism and Electronics:

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

- ❖ Understand the Gauss law and its application to obtain electric field in different cases and formulate the relationship between electric displacement vector, electric polarization, Susceptibility, Permittivity and Dielectric constant.
- ❖ Distinguish between the magnetic effect of electric current and electromagnetic induction and apply the related laws in appropriate circumstances.
- ❖ Understand Biot and Savart's law and Ampere's circuital law to describe and explain the generation of magnetic fields by electrical currents.
- ❖ Develop an understanding on the unification of electric and magnetic fields and Maxwell's equations governing electromagnetic waves.
- ❖ Phenomenon of resonance in LCR AC-circuits, sharpness of resonance,Q- factor,Power factor and the comparative study of series and parallel resonant circuits.
- ❖ Describe the operation of p-n junction diodes, zener diodes, light emitting diodes and transistors
- ❖ Understand the operation of basic logic gates and universal gates and their truth tables.

Semester - 4: Modern Physics :

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

- ❖ Develop an understanding on the concepts of Atomic and Modern Physics, basic elementary quantum mechanics and nuclear physics.
- ❖ Develop critical understanding of concept of Matter waves and Uncertainty principle.

- ❖ Get familiarized with the principles of quantum mechanics and the formulation of Schrodinger wave equation and its applications.
- ❖ Examine the basic properties of nuclei, characteristics of Nuclear forces, salient features of Nuclear models and different nuclear radiation detectors.
- ❖ Classify Elementary particles based on their mass, charge, spin, half life andinteraction.
- ❖ Get familiarized with the nano materials, their unique properties and applications.
- ❖ Increase the awareness and appreciation of superconductors and their practical applications.

3. Recommended Skill enhancement courses: (Titles of the courses given below and details of the syllabus for 4 credits (i.e., 2 units for theory and Lab/Practical) for 5 hrs class-cum-lab work

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4. Recommended Co-curricular activities:(Co-curricular Activities should not promote copying from text book or from others' work and shall encourage self/independent and group learning)

A. Measurable:

1. Assignments on:

2. Student seminars (Individual presentation of Courses) on topics relating to:
   Quiz Programmes on: RIndividual Field Studies/projects: Motion of Rocket,SHM applications
3. Group discussion on:
4. Group/Team Projects on:

B General

1. Collection of news reports and maintaining a record of Course-cuttings relating to topics covered in syllabus
2. Group Discussions on:
3. Watching TV discussions and preparing summary points recording personal observations etc., under guidance from the Lecturers
4. Any similar activities with imaginative thinking.

5. Recommended Continuous Assessment methods:

Details of course-wise Syllabus

BSc	Semester: I	Credits: 4
Course: 1	Mechanics, Waves and Oscillations	Hrs/Wk: 4

Learning outcomes:

- To understand basic theories related with properties of matter and its applications to determine values of various physical quantities associated with matter.
- Be able to apply knowledge of the properties of matter to explain natural physical processes and related technological advances.
- To learn about fundamentals of verbal and mathematical concepts of waves and oscillations
- We should make the students to know their skills required to get the information from the syllabus and use them in a proper way

UNIT I:

Mechanics of Particles: Review of Newton's Laws of Motion, Motion of variable mass system, Motion of a rocket, Multistage rocket, Concept of impact parameter, scattering cross-section, Rutherford scattering-Derivation.

Mechanics of Rigid bodies: Rigid body, rotational kinematic relations, Equation of motion for a rotating body, Angular momentum and Moment of inertia tensor, Euler equations, Precession of a spinning top, Gyroscope, Precession of the equinoxes

UNIT II:

Motion in a Central Force Field: Central forces, definition and examples, characteristics of central forces, conservative nature of central forces, Equation of motion under a central force, Kepler's laws of planetary motion- Proofs, Motion of satellites, Basic idea of Global Positioning System (GPS), weightlessness, Physiological effects of astronauts

UNIT III:

Relativistic Mechanics: Introduction to relativity, Frames of reference, Galilean transformations, absolute frames, Michelson-Morley experiment, negative result, Postulates of Special theory of relativity,Lorentz transformation, time dilation, length contraction, variation of mass with velocity, Einstein's mass-energy relation.

UNIT IV:

Undamped, Damped and Forced oscillations: Simple harmonic oscillator and solution of the differential equation, Damped harmonic oscillator, Forced harmonic oscillator – Their differential equations and solutions, Resonance,Logarithmic decrement, Relaxation time and Quality factor.

Coupled oscillations: Coupled oscillators - introduction , Two coupled oscillators, Normal coordinates and Normal Modes.

UNIT V:

Vibrating Strings: 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 andHarmonics.

Ultrasonic's: Ultrasonics, General Properties of ultrasonic waves, Production of ultrasonics by piezoelectric and magnetostriction methods, Detection of ultrasonics, Applications of ultrasonic waves, SONAR

REFERENCE BOOKS:

1. Sc. Physics, Vol.1, Telugu Academy, Hyderabad
2. Fundamentals of Physics Vol. I - Resnick, Halliday, Krane ,Wiley India 2007
3. College Physics-I. T. Bhimasankaram and G. Prasad. Himalaya Publishing House.
4. University Physics-FW Sears, MW Zemansky& HD Young,Narosa Publications,Delhi
5. Mechanics, S.G.Venkatachalapathy, Margham Publication, 2003.
6. Waves and Oscillations. N. Subramanyam and Brijlal, VikasPulications.
7. Unified Physics - Waves and Oscillations, Jai PrakashNath&Co.Ltd.
8. Waves & Oscillations. S.Badami, V. Balasubramanian and K.R. Reddy, OrientLongman.
9. The Physics of Waves and Oscillations, N.K.Bajaj, Tata McGraw Hill
10. Science and Technology of Ultrasonics- Baldevraj, Narosa, New Delhi,2004

BSc	Semester: I	Credits: 1
Course: 1	Mechanics, Waves and Oscillations Lab	Hrs/Wk: 2

Details of Lab/Practical/Experiments/Tutorials syllabus:

Minimum of 6 experiments to be done and recorded:

1. Young's modulus of the material of a bar (scale) by uniform bending
2. Young's modulus of the material a bar (scale) by non- uniform bending
3. Surface tension of a liquid by capillary rise method
4. Viscosity of liquid by the flow method (Poiseuille's method)
5. Bifilar suspension –Moment of inertia of a regular rectangular body.
6. Fly-wheel -Determination of moment of inertia
7. Rigidity modulus of material of a wire-Dynamic method (Torsional pendulum)
8. Volume resonator experiment
9. Determination of 'g' by compound/bar pendulum
10. Simple pendulum- normal distribution of errors-estimation of time period and the error of the mean by statistical analysis
11. Determination of the force constant of a spring by static and dynamic method.

11. Recommended Co-curricular activities:(Co-curricular Activities should not promote copying from text book or from others' work and shall encourage self/independent and group learning)

A. Measurable:

1. Assignments on: Motion of a rocket, Multistage rocket, Rutherford scattering-Derivation. Precession of a spinning top, Gyroscope, Precession of the equinoxes, Kepler's laws of planetary motion-Proofs, Motion of satellites, Michelson-Morley experiment, negative result, Postulates of Special theory of relativity, Lorentz transformation, Simple harmonic oscillator and solution of the differential equation, Damped harmonic oscillator, Forced harmonic oscillator – Their differential equations and solutions, Transverse wave propagation along a stretched string, Production of ultrasonics by piezoelectric and magnetostriction methods, Detection of ultrasonics, Coupled Oscillators

2. Student seminars (Individual presentation of Courses) on topics relating to: Motion of variable mass system, Motion of a rocket, Multistage rocket, Rutherford scattering-Derivation. Rigid body, rotational kinematic relations, Equation of motion for a rotating body. Central Forces- Kepler's laws, Special theory of relativity, Michelson Morley experiment, Lorentz transformation, Simple Harmonic Motion, Coupled Oscillators, Ultrasonics,

Quiz Programmes on: Rutherford Scattering, Mechanics of rigid bodies,Keplers laws, Special theory of relativity,SHM,Ultrasonics

3. Individual Field Studies/projects:
4. Group discussion on: Newtons Laws of Motion, Motion of satellites, Basic idea of Global Positioning System (GPS),Special theory of relativity, SHM
5. Group/Team Projects on: Motion of a rocket, Multistage rocket, Concept of impact parameter, Central forces, Kepler's laws of planetary motion-Proofs, Motion of satellites, Basic idea of Global Positioning System (GPS), weightlessness. Ultrasonics, General Properties of ultrasonic waves, Production of ultrasonics by piezoelectricand magnetostriction methods, Detection of ultrasonics

B. General

1. Collection of news reports and maintaining a record of Course-cuttings relating to topics covered in syllabus
2. Group Discussions on:
3. Watching TV discussions and preparing summary points recording personal observations etc., under guidance from the Lecturers
4. Any similar activities with imaginative thinking.

12. Recommended Continuous Assessment methods:

B Sc	Semester: 2	Credits: 4
Course: 2	Wave Optics	Hrs/Wk: 4

Student able to Learning:

- Understand the nature of light and principles of Laser and holography.
- Analyse the intensity variation of light due to interference, diffraction and polarization.
- Solve problems in Optics by selecting the appropriate equations and performing numerical or analytical calculations.
- Student can able to operation of optical devices including polarizers, interferometers,and Lasers.

UNIT I: Interference of light: (12hrs)

Introduction, Conditions for interference of light, Interference of light by division of wave front and amplitude,Phase change on reflection- Stokes' treatment, Lloyd's single mirror, Interference in thin films: Plane parallel and wedge- shaped films, colours in thin films, Newton's rings in reflected light-Theory and experiment, Determination of wavelength of monochromatic light, Michelson interferometer anddetermination of wavelength.

UNIT II: Diffraction of light:(12hrs)

Introduction, Types of diffraction: Fresnel and Fraunhoffer diffractions, Distinction between Fresnel and Fraunhoffer diffraction,Fraunhoffer diffraction at a single slit, Plane diffraction grating,Determination of wavelength of light using diffraction grating, Resolving power of grating, Fresnel's half period zones, Explanation of rectilinear propagation of light, Zone plate, comparison of zone plate with convex lens.

UNIT III: Polarisation of light:(12hrs)

Polarized light: Methods of production of plane polarized light, Double refraction, Brewster's law, Malus law, Nicol prism, Nicol prism as polarizer and analyzer, Quarter wave plate, Half wave plate, Plane, Circularly and Elliptically polarized light-Production and detection, Optical activity, Laurent's half shade polarimeter: determination of specific rotation.

UNIT IV: Aberrations and Fibre Optics: (12hrs)

Monochromatic aberrations, Spherical aberration, Methods of minimizing spherical aberration, Coma, Astigmatism and Curvature of field, Distortion; Chromatic aberration-the achromatic doublet; Achromatism for two lenses (i) in contact and (ii) separated by a distance. **Fibre optics:** Introduction to Fibers, different types of fibers, rays and modes in an optical fiber, Principles of fiber communication (qualitative treatment only), Advantages of fiber optic communication.

UNIT V: Lasers and Holography:(12hrs)

Lasers: Introduction, Spontaneous emission, stimulated emission, Population Inversion, Laser principle, Einstein coefficients, Types of lasers-He-Ne laser, Ruby laser, Applications of lasers; Holography: Basic principle of holography, Applications of holography

REFERENCE BOOKS:

1. BSc Physics, Vol.2, Telugu Akademy, Hyderabad
2. A Text Book of Optics-N Subramanyam, L Brijlal, S.Chand& Co.
3. Optics-Murugeshan, S.Chand& Co.
4. Unified Physics Vol.IIOptics, Jai PrakashNath&Co.Ltd., Meerut
5. Optics,F.A. Jenkins and H.G.White, McGraw-Hill
6. Optics, AjoyGhatak,TataMcGraw-Hill.
7. Introduction of Lasers – Avadhanulu, S.Chand& Co.
8. Principles of Optics- BK Mathur, Gopala Printing Press, 1995

B Sc	Semester: 2	Credits: 1
Course: 2	Wave Optics Lab	Hrs/Wk: 2

Details of Lab/Practical/Experiments/Tutorials syllabus:

Minimum of 6 experiments to be done and recorded

1. Determination of radius of curvature of a given convex lens-Newton's rings.
2. Resolving power of grating.
3. Study of optical rotation –polarimeter.
4. Dispersive power of a prism.
5. Determination of wavelength of light using diffraction grating-minimum deviationmethod.
6. Determination of wavelength of light using diffraction grating-normal incidencemethod.
7. Resolving power of a telescope.
8. Refractive index of a liquid-hallow prism
9. Determination of thickness of a thin wire by wedge method
10. Determination of refractive index of liquid-Boy's method.
11. Determination of cauchy's constants (Using prisim A and B).

Recommended Co-curricular activities:(Co-curricular Activities should not promote copying from text book or from others' work and shall encourage self/independent and group learning)

C. Measurable:

5. Assignments on: Lloyd's single mirror, Interference in thin films: Plane parallel and wedge-shaped films, colours in thin films, Newton's rings in reflected light-Theory and experiment, Determination of wavelength of monochromatic light, Michelson interferometer and determination of wavelength. Distinction between Fresnel and Fraunhoffer diffraction,Fraunhoffer diffraction at a single slit, Plane diffraction grating,Determination of wavelength of light using diffraction grating, Zone plate, comparison of zone plate with convex lens. Brewster's law, Malus law, Nicol prism, Nicol prism as polarizer and analyzer, Quarter wave plate, Half wave plate, spherical aberration, Coma, Astigmatism and Curvature of field, Distortion; Chromatic aberration-the achromatic doublet; Achromatism for two lenses (i) in contact and (ii) separated by a distance. Laser principle, Einstein coefficients, Types of lasers-He-Ne laser, Ruby laser, Applications of lasers; Holography:

6. Student seminars (Individual presentation of Courses) on topics relating to:Intereference, Abberations, Opticalfiber communicaton, Holography, Diffraction,Polarization, Lasers.
7. Quiz Programmes on: Interference, Diffraction,Polarization, Optical fibers, Lasers, Abberations
8. Individual Field Studies/projects:
9. Group discussion on:Interefernce, Diffraction, Polarization
10. Group/Team Projects on: Lasers, Optical fibers

D. General

1. Collection of news reports and maintaining a record of Course-cuttings relating to topics covered in syllabus
2. Group Discussions on:
3. Watching TV discussions and preparing summary points recording personal observations etc., under guidance from the Lecturers
4. Any similar activities with imaginative thinking.

Recommended Continuous Assessment methods:

B Sc	Semester: 3	Credits: 4
Course: 3	Heat and thermodynamics	Hrs/Wk: 4

Student able to Learning:

- Students will be able to Perform experiments and interpret the results of observation, including making an assessment of experimental uncertainties.
- They develop the ability to apply the knowledge acquired in the classroom and laboratories to specific problems in theoretical and experimental Physics.
- To apply the theories learnt and the skills acquired to solve real time problems
- To understand the concepts and significance of the various physical phenomena

UNIT I: Kinetic Theory of gases: (12 hrs)

Kinetic Theory of gases-Introduction, Maxwell's law of distribution of molecular velocities (qualitative treatment only) and its experimental verification,Mean free path, Degrees of freedom, Principle of equipartition of energy (Qualitative ideas only), Transport phenomenon in ideal gases: viscosity, Thermal conductivity and diffusion of gases.

UNIT II: Thermodynamics: (12hrs)

Introduction- Isothermal and Adiabatic processes, Reversible and irreversible processes, Carnot's engine and its efficiency, Carnot's theorem, Thermodynamic scale of temperature and its identity with perfect gas scale, Second law of thermodynamics: Kelvin's and Clausius statements, Principle of refrigeration, Entropy, Physical significance, Change in entropy in reversible and irreversible processes; Entropy and disorder-Entropy of Universe; Temperature-Entropy (T-S) diagram and its uses ; change of entropy when ice changes into steam.

UNIT III: Thermodynamic Potentials and Maxwell's equations: (12hrs)

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 to (i) Clausius-Clayperon's equation (ii) Value of CP-CV (iii) Value of CP/CV (iv) Joule-Kelvin coefficient for ideal gases.

UNIT IV: Low temperature Physics:(12hrs) Methods for producing very low temperatures, Joule Kelvin effect, Porous plug experiment ,Joule expansion, Distinction between adiabatic and Joule Thomson expansion, Expression for Joule Thomson cooling, Liquefaction of air by Linde's method, Production of low temperatures by adiabatic demagnetization (qualitative), Practical applications of substancesat low temperatures.

UNIT V: Quantum theory of radiation: (12 hrs) Blackbody and its spectral energy distribution of black body radiation, Kirchoff's law, Wein'sdisplacement law, Stefan-Boltzmann's law and Rayleigh-Jean's law (Noderivations), 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 Angstrompyroheliometer, Estimation of surface temperature of Sun.

Reference books:

1. BSc Physics, Vol.2, Telugu Akademy, Hyderabad
2. Thermodynamics, R.C.Srivastava, S.K.Saha&AbhayK.Jain, Eastern Economy Edition.
3. Unified Physics Vol.2, Optics & Thermodynamics, Jai PrakashNath&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

B Sc	Semester: 3	Credits: 1
Course: 3	Heat and thermodynamics Lab	Hrs/Wk: 2

Details of Lab/Practical/Experiments/Tutorials syllabus:

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. Thermoemf- thermo couple - Potentiometer
8. Thermal behavior of an electric bulb (filament/torch light bulb)
9. Measurement of Stefan's constant- emissive method
10. Study of variation of resistance with temperature - Thermistor.
11. Calculation of temperature coefficient of given material using Carry Fosters bridge.

9. Recommended Co-curricular activities:(Co-curricular Activities should not promote copying from text book or from others' work and shall encourage self/independent and group learning)

E. Measurable:

Assignments on: Maxwell's law of distribution of molecular velocities, Transport phenomenon in ideal gases: viscosity, Thermal conductivity and diffusion of gases. Introduction- Isothermal and Adiabatic processes, Reversible and irreversible processes, Carnot's engine and its efficiency, Carnot's theorem, Thermodynamic scale of temperature, Thermodynamic potentials-Internal Energy, Enthalpy, Helmholtz Free Energy, Gibb's Free Energy and their significance, Derivation of Maxwell's thermodynamic relations fromthermodynamic potentials, Joule Kelvin effect, Porous plug experiment ,Joule expansion, Distinction between adiabatic and Joule Thomson expansion, Expression forJoule Thomson cooling, Liquefaction of air by Linde's method, Production of lowtemperatures by adiabatic demagnetization

10. Student seminars (Individual presentation of Courses) on topics relating to: Kinetic Theory of Gases, Carnots Engine and its efficiency, Carnot Theorem, Entropy, Maxwell Thermodynamic Equations, Joule Kelvin effect, Production of low temperatures, Plank Radiation law, Weins law,Pyrometers,
11. Quiz Programmes on: Kinetic theory of gases, Heat and Temperature entropy, Isothermal and Adiabatic process,Thermodynamic Potentials, Low temperature Physics , Thermal Radiation.
12. Individual Field Studies/projects: Carnots Engine, Pyrometers, Adaibatic demagnetization, Porus plug experiment. Liquification of gases.
13. Group discussion on:Kinetic theory of gases, Quantum theory of Radiation, Low temperature physics and thermodynamic potentials,
14. Group/Team Projects on: Carnots Engine, Pyrometers, Adaibatic demagnetization, Porus plug experiment. Liquification of gases.

F. General

5. Collection of news reports and maintaining a record of Course-cuttings relating to topics covered in syllabus
6. Group Discussions on:
7. Watching TV discussions and preparing summary points recording personal observations etc., under guidance from the Lecturers
8. Any similar activities with imaginative thinking.

Recommended Continuous Assessment methods:

B Sc	Semester: 4	Credits: 4
Course: 4	Electricity, Magnetism & Electronics	Hrs/Wk: 4

Student Able learn:

- To learn about Gauss law and solve the electric field and magnetic field for various geometric objects and to learn basic electronic concepts in analog and digital theory.
- To be Explain all the topics of Experiments, Concepts and Derivations to the student
- Apply the principles of electronics in day to day life.
- Encourage all the students to study higher educational courses in reputed institutes and to enrich the students with creative, logical and analytical skills and to motivate the students towards research side

UNIT I:

Electrostatics: (6hrs) : Gauss's law-Statement and its proof, Electric field intensity due to (i) uniformly charged solid sphere and (ii) an infinite conducting sheet of charge, Deduction of Coulomb's law from Gauss law, Electrical potential–Equipotential surfaces, Potential due to a uniformly charged sphere.

Dielectrics: (6 hrs): Dielectrics-Polar and Non-polar dielectrics- Effect of electric field on dielectrics,Dielectric strength, Capacitance of a parallel plate condenser with dielectric slab between the plates, Electric displacement D, electric polarization P,Relation between D, E and P, Dielectric constant and electric susceptibility.

UNIT II:

Magnetostatics: (6 hrs): Biot-Savart's law and its applications: (i) circular loop and (ii) solenoid, Ampere's Circuital Law and its application to Solenoid, Hall effect, determination of Hall coefficient and applications.

Electromagnetic Induction: (6 hrs): Faraday's laws of electromagnetic induction, Lenz's law, Self induction and Mutual induction,Self inductance of a long solenoid, Mutual inductance of two coils, Energy stored in magnetic field, Eddy currents.

UNIT III:

Alternating currents: (6 hrs): Alternating current - Relation between current and voltage in L,C, R, LR and CR circuits, Phasor and Vector diagrams, LCR series and parallel resonant circuit, Q – factor, Power factor.

Electromagnetic waves-Maxwell's equations:(6 hrs) : Idea of displacement current,Maxwell's equations-Derivation, Maxwell's wave equation (with derivation), Transverse nature of electromagnetic waves, Poynting theorem (Statement andproof). Velocity of wave equation using maxwells relations in vaccume.

UNIT IV:

Basic Electronic devices: (12 hrs): PN junction diode, Zenerdiode andLight Emitting Diode (LED) and their I-V characteristics, Zener diode as a regulator- Transistors and its operation, CB, CE and CC configurations, Input and output characteristicsofa transistor in CE mode, Relation between alpha, beta and gamma; Transistor as an amplifier.

UNIT-V:

Digital Electronics: (12 hrs): Number systems, Conversion of binary to decimal system and vice versa, Binary addition & Binary subtraction (1's and 2's complement methods), Laws of Boolean algebra, DeMorgan's laws-Statements and Proofs, Basic logic gates, NAND and NOR as universal gates, Exclusive-OR gate, Half adder and Full adder circuits.

REFERENCE BOOKS

1. BSc Physics, Vol.3, Telugu Akademy, Hyderabad.
2. Electricity and Magnetism, D.N. Vasudeva. S. Chand & Co.
3. Electricity and Magnetism, B.D.Duggal and C.L.Chhabra. Shobanlal& Co.
4. Electricity, Magnetism with Electronics, K.K.Tewari, R.Chand& Co.,
5. Electricity and Magnetism, R.Murugeshan, S. Chand & Co.
6. Principles of Electronics, V.K. Mehta, S.Chand& Co.,
7. Digital Principles and Applications, A.P. Malvino and D.P.Leach, McGrawHill Edition.

B Sc	Semester: 4	Credits: 1
Course: 4	Electricity, Magnetism & Electronics Lab	Hrs/Wk: 2

Details of Lab/Practical/Experiments/Tutorials syllabus:

Minimum of 6 experiments to be done and recorded

1. Figure of merit of a moving coil galvanometer.
2. LCR circuit series/parallel resonance, Q factor.
3. Determination of ac-frequency –Sonometer.
4. Verification of Kirchoff's laws and Maximum Power Transfer theorem.
5. Field along the axis of a circular coil carrying current-Stewart & Gee's apparatus.
6. PN Junction Diode Characteristics
7. Zener Diode –V-I Characteristics
8. Zener Diode as a voltage regulator
9. Transistor CE Characteristics- Determination of hybrid parameters
10. Logic Gates- OR,AND,NOT and NAND gates. Verification of Truth Tables.
11. Verification of De Morgan's Theorems.
12. Construction of Half adder and Full adders-Verification of truth tables
13. Universal gates construction and verification of truth tables.

Recommended Reference books:

14. Recommended Co-curricular activities:(Co-curricular Activities should not promote copying from text book or from others' work and shall encourage self/independent and group learning)

G. Measurable:

1. **Assignments on**: Gauss's law-Statement and its proof, Electric field intensity due to uniformly charged solidsphere and Potential due to a uniformly charged sphere.
2. **Student seminars (Individual presentation of Courses) on topics relating to**:
3. Biot-Savart's law and its applications: (i) circular loop and (ii) solenoid, Ampere's Circuital Law and its application to Solenoid, Hall effect, determination of Hall coefficient and applications
4. **Quiz Programmes on**: PN junction diode, Zenerdiode andLight Emitting Diode (LED) and their I-V characteristics, Zener diode as a regulator- Transistors and its operation, CB, CE and CC configurations
5. **Individual Field Studies/projects**: Maxwell's equations-Derivation, Maxwell's wave equation (with derivation), Transverse nature of electromagnetic waves, Poynting theorem (Statement andproof)
6. **Group discussion on:** Number systems, Conversion of binary to decimal system and vice versa, Binary addition & Binary subtraction (1's and 2's complement methods), Laws of Boolean algebra
7. **Group/Team Projects on**: Alternating current - Relation between current and voltage in L,C, R, LR and CR circuits, Phasor and Vector diagrams, LCR series and parallel resonant circuit, Q –factor, Power factor.

H. General

8. Collection of news reports and maintaining a record of Course-cuttings relating to topics covered in syllabus
9. Group Discussions on:
10. Watching TV discussions and preparing summary points recording personal observations etc., under guidance from the Lecturers
11. Any similar activities with imaginative thinking.

Recommended Continuous Assessment methods:

B Sc	Semester: 4	Credits: 4
Course: 5	Modern Physics	Hrs/Wk: 4

Student able learn:

- To Create awareness on the topics of Atomic & Molecular Physics, Quantum mechanics, Nuclear Physics, and Solid state physics.
- To be Explain all the topics of Experiments, Concepts and Derivations to the student.
- Explain the basic principles of quantum mechanics and apply to Atomic, Molecular structure of energy levels etc..
- Motivate all the students to pursue PG courses in reputed institutes and to endow the students with creative and analytical skills; this will equip them to become entrepreneurs.

UNIT I :

Atomic and Molecular Physics:(12 hrs): Vector atom model and Stern-Gerlach experiment, Quantum numbers associated with it,Angular momentum of the atom, Coupling schemes, Spectral terms and spectral notations, Selection rules, Intensity rules, Fine structure of Sodium D-lines, Zeeman effect, Experimentalarrangement to study Zeeman effect; Raman effect, Characteristics of Raman effect. Experimental arrangement to study Raman effect, Quantum theory of Raman effect, Applications of Raman effect.

UNIT II:

Matter waves &Uncertainty Principle:(12 hrs): Matter waves, de Broglie's hypothesis, Wave length of matter waves, Properties of matter waves, Davisson and Germer's experiment, Phase and group velocities, Heisenberg's uncertainty principle for position and momentum& energy and time, Illustration of uncertainty principle using diffraction of beam of electrons and photons (Gamma ray microscope),Bohr's principle of complementarity.

UNIT III:

Quantum (Wave) Mechanics:(12 hrs): Basic postulates of quantum mechanics, Schrodinger time independent and time dependent wave equations-Derivations, Physical interpretation of wave function, Eigen functions, Eigen values, Application of Schrodinger wave equation to (i) one dimensional potential box of infinite height(InfinitePotential Well) and (ii) three dimensional box - tunneling effect.

UNIT IV:

Nuclear Physics:(12 hrs): *Nuclear Structure*: General Properties of Nuclei, Mass defect, Binding energy; *Nuclear forces*:Characteristics of nuclear forces- Yukawa's meson theory; *Nuclear Models*: Liquid drop model, The Shell model, Magic numbers; *Nuclear Radiation detectors*: G.M. Counter, Cloud chamber, Solid State detector; *Elementary Particles*: Elementary Particles and their classification.

UNIT-V:

Nano materials:(7hrs): Nanomaterials – Introduction, Electron confinement, Size effect, Surface to volume ratio, Classification of nano materials– (0D, 1D, 2D); Quantum dots, Nano wires, Fullerene, CNT, Graphene(Mention of structures and properties),Distinct properties of nano materials (Mention-*mechanical,optical, electrical, and magnetic properties*); Mention of applications of nano materials: (*Fuel cells,Phosphors for HD TV).*

Superconductivity: (5 hrs): Introduction to Superconductivity, Experimental results-critical temperature, critical magnetic field, Meissner effect , Isotope effect,Type I and Type II superconductors, BCS theory (elementary ideas only),Applications of superconductors

REFERENCE BOOKS

1. BSc Physics, Vol.4, Telugu Akademy, Hyderabad
2. Atomic Physics by J.B. Rajam; S.Chand& Co.,
3. Modern Physics by R. Murugeshan and Kiruthiga Siva Prasath. S. Chand & Co.
4. Concepts of Modern Physics by Arthur Beiser. Tata McGraw-Hill Edition.
5. Nuclear Physics, D.C.Tayal, Himalaya Publishing House.
6. S.K. Kulkarni, Nanotechnology: Principles & Practices (Capital Publ.Co.)
7. K.K.Chattopadhyay&A.N.Banerjee, Introd.to Nanoscience and Technology(PHI LearningPriv.Limited).
8. Nano materials, A K Bandopadhyay. New Age International Pvt Ltd (2007)
9. Textbook of Nanoscience and Nanotechnology, BS Murthy, P Shankar, BaldevRaj,BB Rath and J Murday-Universities Press-IIM

B Sc	Semester: 4	Credits: 4
Course: 5	Modern Physics Lab	Hrs/Wk: 4

Details of Lab/Practical/Experiments/Tutorials syllabus:

Minimum of 6 experiments to be done and recorded

1. e/m of an electron by Thomson method.
2. Determination of Planck's Constant (photocell).
3. Verification of inverse square law of light using photovoltaic cell.
4. Determination of the Planck's constant using LEDs of at least 4 different colours.
5. Determination of work function of material of filament of directly heated vacuumdiode.
6. Study of absorption of α-rays.
7. Study of absorption of β-rays.
8. Determination of Range of β-particles.
9. Determination of M & H.
10. Analysis of powder X-ray diffraction pattern to determine properties of crystals.
11. Energy gap of a semiconductor using junction diode.
12. Energy gap of a semiconductor using thermistor
13. GM counter characteristics
14. Study of photo cell characteristics.

Recommended Reference books:

9. Recommended Co-curricular activities:(Co-curricular Activities should not promote copying from text book or from others' work and shall encourage self/independent and group learning)

I. Measurable:

Assignments on: Stern-Gerlach experiment, Quantum numbers associated with it, Angular momentum of the atom, Coupling schemes, Experimental arrangement to study Zeeman effect; Raman effect, Characteristics of Raman effect. Experimental arrangement to study Raman effect, Applications of Raman effect, Wave length of matter waves,; *Nuclear Radiation detectors*: G.M. Counter, Cloud chamber, Solid State detector, Classification of nano materials– (0D, 1D, 2D); Quantum dots, Nano wires, Fullerene, CNT, Graphene(Mention of structures and properties),

Student seminars (Individual presentation of Courses) on topics relating to: Stern-Gerlach experiment, Zeeman effect, Raman effect. Davisson and Germer's experiment, , Heisenberg's uncertainty principle Schrodinger time independent and time dependent wave equations-Derivations, , The Shell model, Magic numbers;,

8. **Quiz Programmes on**: Zeeman effect, Matter waves, de Broglie's hypothesis, Heisenberg's uncertainty principle for position and momentum& energy and time, Schrodinger time independent and time dependent wave equations-Derivations.
9. **Individual Field Studies/projects**: *Nuclear Radiation detectors*: G.M. Counter, Cloud chamber, Solid State detector, Liquid drop model, Distinct properties of nano materials
10. **.Group discussion on:**
Properties of matter waves, Davisson and Germer's experiment, Eigen functions, Eigen values, Application of Schrodinger wave equation to (i) one dimensional potential box of infinite height(InfinitePotential Well), Liquid drop model, The Shell model, Magic numbers
11. **Group/Team Projects on**: Basic postulates of quantum mechanics, Schrodinger time independent and time dependent wave equations-Derivations, Physical interpretation of wave function

J. General

12. Collection of news reports and maintaining a record of Course-cuttings relating to topics covered in syllabus
13. Group Discussions on:
14. Watching TV discussions and preparing summary points recording personal observations etc., under guidance from the Lecturers
15. Any similar activities with imaginative thinking.

Recommended Continuous Assessment methods:

(MODEL-PAPER-SEMESTER END EXAMINATION)

UG: DEGREE EXAMINATIONS

SEMESTER-(I)

COURSE-(1)-MECHANICS,WAVES AND OSCILLATIONS

3 Hours Max Marks : 75

SECTION-A

ANSWER ANY FIVE QUESTIONS **5 X 5 -25M**

I.Explain the terms

1) impact parameters

అభిఘాత పరామితి

2)Write a short note on Gyroscope

గైరోస్కోప్‌ను వివరించుము

3)Show the conservative nature of central forces

కేంద్రీయ బలాల యొక్క నిత్యత్వమును చూపుము

4)Give brief idea about GPS

జి.పి.యస్ గురించి క్లుప్తంగా వ్రాయుము

5)If a Rod travels with a speed with V=0.6c along its length , calculate the percentage of contraction

0.6 వేగముతో చలించుచున్న కడ్డీ యొక్క సంకుచితత్వము యొక్క శాతమును కనుగొనుము

6)What is the fundamental frequency of piezo-electric crystal if $y = 8*10^8\ pa, p = 2.5*10^3\ kg/m^3$ and vibrating length is $3X10^{-3}$

పైజో స్ఫటికము యొక్క ప్రాధమిక పౌన:పున్యమును కనుగొనుము

7)Find the fundamental frequency of longitudinal wave in rod of 1m length fixed at the mid point with both the ends being free .given the velocity of the sound in the bar V=3000m/s and the density of the material of the bar p=8600kg/m^3

మధ్యన బిగించబడిన 1మీటర్ కడ్డీలోని అనుదైర్ఘ్య తరంగ ప్రాధమిక పౌన:పున్యమును కనుగొనుముకడ్డీలో ధ్వని వేగము V=3000m/s కడ్డీ లోహ సాంద్రత p=8600kg/m^3

8) Write five applications of Ultrasonic

అతిధ్వనుల యొక్క అనువర్తనాలను ఐదు వ్రాయుము

Section – B

Answer all questions. 5 x 10 = 50M

9. a)Explain the principle of motion of a rocket and derive for its velocity at any instant when it is moving under constant gravitational field

రాకెట్ గమన నియమమును వివరించుము.స్థిర గురుత్వాకర్షణ కక్షలో తిరుగుతున్నప్పుడు ఏదైనా ఒక సమయంలో దాని వేగమును రాబట్టుము

OR

b)Derive Euler equations.

యూలర్ సూత్రమును రాబట్టుము

10) a)Define Central forces and show that they are conservative in nature.

కేంద్రీయ బలాలను వివరించి వాటి నిత్యత్వంను నిరూపించుము

OR

b)State and prove Kepler's laws of planetary motion.

కెప్లర్ గ్రహ నియమాలను వ్రాసి మరియు నిరూపించుము

11). a)Describe Michelsons- morleys experiment. Explain negative result.

మైకేల్సన్ – మోర్లే ప్రయోగమును వివరించి, ఋణ ఫలితములను వివరించుము

OR

b)Explain Einsteins mass energy relation.

ఐన్‌స్టీన్ యొక్క ద్రవ్యరాశి –శక్తి నియమాన్ని వివరించుము

12). a)Solve the differential equation of damped Harmonic Oscillator and discuss the critical damping.

సందిగ్ధ తీగలో విరుద్ధ దోలనాల అవకలన సమీకరణమును సాధించుము

OR

b)Discuss about two coupled oscillator and derive expression for normal modes.

ద్వంద్వ యుగ్మత దోలనాల సమీకరణమును సాధించుము

13 a)Derive an equation for the propagation of transvers waves along string. Discuss the case of string clamped at both ends.

సాగతీయబడిన తీగలో తిర్యక్ తరంగ సమీకరణమును రాబట్టుము. ఇరువైపలా బిగించబడ్డ తీగలోని కంపనాలను వివరించుము

OR

b)Explain the production of Ultrsonics using Piezo electric method.

పైజో విద్యుత్ వద్ధతి ద్వారా అతి ధ్వనులు ఉత్పాదనమును వివరించుము

(MODEL-PAPER-SEMESTER END EXAMINATION)

UG DEGREE EXAMINATIONS

SEMESTER-(II)

COURSE-(2)-OPTICS

TIME:3Hrs **Max Marks :75**

Section – A

Answer any **FIVE** questions. 5 x 5M = 25M

1. Explain the defects coma and astigmatism in a lens. How are they minimized?

   బిందు విస్తరణ మరియు కేంద్రక ఆవరణ వివరింపుము. వాటిని ఏ విధంగా తొలగించవచ్చును.

2. Distinguish between Fresnel and Fraunhoffer diffractions.

   ఫ్రెనల్ మరియు ఫ్రాన్ హెఫర్ వివర్తనముల వ్యత్యాసము వ్రాయుము.

3. What are quarter and half wave plates?

   అర్ధతరంగ మరియు క్వార్టను తరంగ పలక వివరింపుము.

4 What is holography? Mention its uses.

   హెలోగ్రఫీ అనగా నేమి. దాని ఉపయోగాలు వ్రాయుము.

5. A double convex lens has radii of 40 cm and 10 cm. If the refractive indices for violet and red colours are 1.52 and 1.51 respectively, what is the longitudinal chromatic aberration for an object at infinity?

   ద్వంద కుంభాకార కటకము యొక్క వ్యాసార్ధాలు 10 సెమ్ 40 సెమ్ ఎరుపు మరియు ఉదారంగుల వక్రీభవన గుణకములు 1.52 మరియు 1.51. వస్తువు అనంతదూరంలో ఉన్నప్పుడు అనుధైర్ఘ్య వర్ణ విపదనము కనుగొనుము.

6. A lens of thickness of 2cm and refractive index 1.5 placed in air has radii of curvature 8 cm and 8 cm. Find the system matrix and focal length.

   2 సెమ్ మందము 1.5 వక్రీభవన గుణకము గల కటకము గాలిలో ఉన్నప్పుడు దాని వక్రతల వ్యాసార్ధము 8. సెమ్ నాభ్యాంతరము మరియు మాత్రికను కనుగొనుము.

7 A 15 cm tube containing cane sugar solution shows optical rotation 7^0. Calculate the strength of the solution.

   2 చెక్కర ద్రామణము 15 సెమ్ గొట్టంలో దృశ్య భ్రమణము 7^0 చూపగా ఆ ద్రావణము యొక్క సామర్థ్యమును లెక్కించుము.

.8. In Newton's rings arrangement the radius of curvature of the curved surfaces is 50 cm. The radii of the 9^{th} and 16^{th} dark rings are 0.18 cm and 0.2235 cm. Calculate the wave length of the source of light.

   లెన్యూటన్ వలయాల ప్రయోగంలో 9 మరియు 16వ చీకటి వలయాల వ్యాసార్ధలు 0.18 cm and 0.2235 cm.వక్రతల వ్యాసార్ధము 50 cm అయినచోకాంతి యొక్క తరంగదైర్ఘ్యము లెక్కించుము.

SECTION-B

Answer all questions. 5 x 10 M= 50M

9. a.What is chromatic aberration? Obtain an expression for the chromatic aberration of a lens.

వర్ణ విపదనము అనగా నేమి? ఒక కటకము యొక్క వర్ణవిపదనము యొక్క

సమీకరణమును సాధించుము?

OR

b.Explain spherical aberration. Describe minimization techniques.

గోళీయ విపదనము అనగా నేమి. దానిని ఎట్లు నివారించవచ్చును.

10. a.How are Newton's rings formed? Describe Newton's rings experiment to determine the wave length of a monochromatic light with necessary theory.

న్యూటన్ వలయాల ఎలా ఏర్పడతాయి. ఏకవర్ణకాంతి తరంగధైర్యాన్ని న్యూటన్ వలయాల ద్వారా ఎలా కనుగొందువు.

OR

b.Explain how to determine thickness of given thin wire by forming wedge shaped film.

వెడ్జ్ విధానము అనుసరించి, ఇచ్చిన తీగ మందమును ఎలా కనుగొందువు.

11. a.What is a zone plate? Describe its action. Explain how a zone plate acts like a convergent lens having multiple foci.

మండల ఫలకము అనగా నేమి. దాని క్రియను వివరించి మండల ఫలకము అనేక న్యాభ్యాంతరము కల కుంభాకార కటకము వలె పనిచేయునని చూపుము.

b.Explain diffraction of light due to single slit.

ఏకరీతి చీలిక వల్ల ఏర్పడు వివర్తనమును వివరింపుము.

12. a.Describe the construction and working of a Nicol prism. Give any method of producing plane polarized light.

నికాల్ పట్టక నిర్మాణమును మరియు పనిచేయు విధానమును వివరింపము. ఏకరీతి ద్రవిత కాంతిని పొందు ఒక విధానమును వివరింపుము.

OR

b.Define optical activity. Describe how the specific rotation of given optically active substance using laurant's half schade polarimeter.

ధ్రువణ తల భ్రమణము అనగా నేమి. లారెంట్ అర్ధఛాయ ధ్రువణ మాపకము ద్వారా భ్రామకమును ఎలా కనుగొందువు.

13. a.Explain construction and working of He-Ne laser.

హీలియం-నియాన్ లేజరు యొక్క నిర్మాణము మరియు పనిచేయు విధానము వివరింపుము

(MODEL-PAPER-SEMESTER END EXAMINATION)

UG: DEGREE EXAMINATIONS

SEMESTER-(III)

COURSE-(3)-THERMODYNAMICS

TIME:3Hrs **MaxMarks :75**

Section –A

Answer any **five**questions. 5 x 5M = 25M

1. Derive an expression for the coefficient of viscosity of a gas on the basis of kinetic theory of gases.

వాయుస్నిగ్ధతాగుణకమును అణుచలన సిద్ధాంతం ద్వారా రాబట్టుము

2. What are pyrometers? Describe disappearing filament optical pyrometer.

మాయమైపోయే తీగ దృశా పైరోమీటర్ నిర్మాణమును వివరించుము

3. State and prove carnot's theorem

కార్నాట్ సిద్ధాంతంను వ్రాసి వివరించుము

4. Obtain clausius- clapeyron equation from Maxwell's equations

మాక్స్‌వెల్ సమీకరణం ద్వారా క్లాసియస్–క్లాపిరాన్ సమీకరణమును ఉత్పాదించుము

5. Discuss the effects of Chloro and fluoro carbons on ozone layer

ఓజోన్ పొర మీద క్లోరో–ఫ్లోరో కార్బన్‌ల యొక్క చర్య వివరించుము

6. What is Entropy. And explain how it changes in a reversible process .

ఎంట్రోపిని వివరింపుము.ఉత్క్రమణీయ ప్రక్రియలో దాని మార్పును వివరించుము

7. The efficiency of a Cornot's engine is 60%. Calculate the increase in temperature of the source so that the efficiency becomes 70%.

కార్నోఇంజను యొక్క సామర్థ్యం 60%. దాని సామర్థ్యం 70%. ఆయితే ఉష్ణఉత్పాదక లోని ఉష్ణోగ్రత పెరుగుదల ఎంత

8.Calculate the surface temperature of the Sun, given the radius of the Sun = 7.04×10^5 Km, distance of the Sun from the earth = 14.72×10^7 Km, solar constant = 1400 W/m^2 and Stefan's constant = 5.7×10^{-8} $Wm^{-2}K^{-4}$.

సూర్యుని ఉపరితల ఉష్ణోగ్రతను లెక్కించుము.సూర్యుని వ్యాసార్ధం 7.04×10^5 Km భూమినుండి సూర్యునికి గల దూరం14.72×10^7 Km సౌర స్థిరాంకం 1400 W/m^2 మరియు స్థెఫాన్ స్థిరాంకం5.7×10^{-8} $Wm^{-2}K^{-4}$

Section - B

Answer all questions. 5x 10M = 50M

9. a.Derive Maxwell's distribution law of velocities.

మాక్స్‌వెల్ వేగ వితరణ సూత్రాన్ని రాబట్టుము

OR

b. Define coefficient of viscosity and thermal conductivity and derive the relation between them using Kinetic theory of gasses.

స్నిగ్ధితాగుణకము మరియు ఉష్ణవాహకత్వముయు నిర్వహించి వాటి మధ్య సంబంధమును వాయు అణు చలన సిద్ధాంతం ద్వారా రాబట్టుము

10. a.Derive Plank's law of radiation. Derive an expression for energy distribution?

ప్లాంక్ వికిరణ సూత్రాన్ని రాబట్టుము, శక్తి వితరణ సూత్రాన్ని వివరింపుము

OR

b. Explain the construction and working of PyroHelio meter.

పైరోహీలియో మీటర్ యొక్క నిర్మాణము మరియు పనితనము వ్రాయుము

11. a.Describe the working of Cornot's engine and derive the expression for its efficiency.

కార్నో ఇంజను పనితనము మరియు దాని సామర్థ్యమును ఉత్పాదించుము

OR

b. Explain T-S diagram and derive expression for effiency.

T-Sపటమును వివరించి దాని సామర్థ్యమును ఉత్పాదించుము

12. a.What are thermodynamic potentials? Derive Maxwell's thermodynamic relations.

ఉష్ణగతిక శక్మాలను నిర్వచించుము, తద్వారా మాక్స్‌వెల్ ఉష్ణగతిక సమీకరణాన్ని రాబట్టండి

OR

b. Define Joule Thomson effect and derive and expression for cooling.

జౌల్ –థామ్స్‌న్ ఫలితమును వివరించుము.జౌల్ –థామ్స్‌న్ శీతలీకరణానికి సమీకరణాన్ని రాబట్టండి

13. a.Describe how low temperatures are produced by adiabatic demagnetization. Give the theory of the experiment.

స్థిరోష్ణక నిరయస్కాంతీకరణం ద్వారా అల్పఉష్ణోగ్రతలను ఏ విధంగా పొందవచ్చునో వివరించుము

OR

b. Explain the liquification of air by Linde's methode.

లిండే పద్ధతి ద్వారా వాయుద్రవీకరణము వివరింపుము

(MODEL-PAPER-SEMESTER END EXAMINATION)
UG: DEGREE EXAMINATIONS
SEMESTER-(IV)
COURSE-(4)-ELECTRICITY MAGNETISM AND ELECTRONICS

TIME:3Hrs **Max Marks :75**

Section – A

Answer any FIVE Questions **5X5 =25M**

1. Derive expression for the potential due to a point charge.

బిందు ఆవేశము వలన కలిగే పొటెన్షియల్‌ను ఉత్పాదించుము?

2. What is Hall Effect? Write the applications of Hall Effect.

హల్ ఫలితము అనగా నేమి. దాని అనువర్తనాలను వ్రాయుము.

3. Write the integral and differential forms of Maxwell's equations.

మాక్స్‌వెల్ నియమాల ఇంటిగ్రల్ మరియు సంకలన రూపములు వ్రాయుము?

4. Derive the relation among D, E and P.

డి.ఇ.పి మధ్య గల సంబంధము వ్రాయుము?

5. Calculate the resonance frequency of a LCR series circuit with a resistance 10&!, inductance 20mH and a capacitance of 0.02μF.

ఎల్ సి.ఆర్ వలయం యొక్క అనునాద పౌనపున్యమును కనుగొనుము నిరోదము వోమ్ 10!, ఇండక్టన్స్ 20mH c= 0.02μF.

6. For a transistor $\alpha = 0.95$ and its emitter current is 1mA. Find its base and collector currents.

ట్రాన్సిస్టర్ యొక్క $\alpha = 0.95$ మరియు ఉద్గార విద్యుత్ 1mA అయితే ఆధార మరియు కలక్టర్ విద్యుత్ విలువ ఎంత?

7. Convert the following binary numbers into equivalent decimal number

i. 101010101 ii. 1111001

ఈ క్రింది ద్వి సంఖ్య మానంలోని సంఖ్యలను దశాంశ సంఖ్యలుగా వ్రాయుము?

i. 101010101 ii. 1111001

8. Perform the following subtraction using 2's compliment method

i. 101101 – 011110 ii. 11110111 – 00001100

ఈ క్రింది వ్యత్యాసములను 2' కాంప్లిమెంట్ పద్ధతి ద్వారా కనుగొనుము.

i. 101101 – 011110 ii. 11110111 – 00001100

SECTION-B

Answer all questions **5 X 10-50 M**

9. (a) State and prove Gauss's law.

గాస్ నియమమును వ్రాసి నిరూపించుము?

(or)

(b) Derive expression for the capacitance of parallel plate capacitor with dielectric slab

సమాంతర పలకల మధ్య రోదకమును ఉంచినప్పుడు కెపాసిటన్సి ని ఉత్పాదించుము?

10 (a) State and explain Biot - Savart's law. Derive an expression for the magic induction at a point on the axis of a current carrying solenoid.

బయోడ్-సావర్ట్ నియమమును వివరించుము? సాలినాయిడ్ లో విద్యుత్ ప్రవహిస్తున్నట్లు దాని అక్షం మీద వున్న బిందువు వద్ద అయిస్కాంత తీవ్రతను కనుగొనుము.

(or)

(b) Explain Faraday's laws of electromagnetic induction. Derive expression for coefficient of coupling.

ఫారడే విద్యుత్ అయిస్కాంత నియమమును వ్రాయుము? కప్లింగ్ గుణకాన్ని ఉత్పాదించుము.

11. (a) Describe the behavior of series LCR circuit when an alternating voltage is applied to it. Explain the condition for resonance.

ఎల్‌సిఆర్. వలయానికి ఎ.సి. వోల్టేజి ఇచ్చినపుడు దాని ప్రవర్తన వ్రాయుము? మరియు అనువాద నియమమును వివరించుము?

(or)

(b) Derive the equation of electromagnetic wave and hence determine the velocity of propagation of electromagnetic wave in free space.

విద్యుత్ అయిస్కాంత తరంగ సమీకరణమును ఉత్పాదించుము? తరంగ ప్రవాహ వేగమును రాబట్టుము.

12. (a) What is transistor? Explain the working of PNP and NPN Transistor.

పి.ఎన్.పి మరియు ఎన్.పి.ఎన్ ట్రాన్సిష్టర్ యొక్క పనితనము వివరింపుము?

(or)

(b) Deduce relation between alpha, beta and gamma.

ఆల్ఫా, బీటా, మరియు గామా ల మధ్య సంబంధము వ్రాయుము.

13. (a) Explain the functioning of a Half Adder and a Full Adder along with respective truth tables.

అర్ధ సంకలన కారిణి (హాఫ్ యాడర్) మరియు పుల్ యాడర్‌ల యొక్క నిజ పట్టీల ద్వారా వీటి యొక్క పనితనము వివరింపుము?

(or)

(b) State and prove Demorgan's laws. Realize AND, OR and NOT gates from NAND logic.

డీ- మార్గన్ సిద్ధాంతమును నిర్వచించి నిరూపింపుము? ఎన్ఎఎన్‌డి ద్వారము ద్వారా అండ్, ఒఆర్, నాట్ ద్వారాలను రాబట్టుము.

(MODEL-PAPER-SEMESTER END EXAMINATION)

UG: DEGREE EXAMINATIONS

SEMESTER-(IV)

COURSE-(5)MODERN PHYSICS

TIME:3Hrs **Max Marks :75**

Section – A

Answer any **FIVE** Questions 5X5 =25M

1. Explain L-S and J-J coupling schemes.

L-S మరియు J-J కప్లింగ్ పద్ధతులను వివరించండి.

2.State and explain Zeeman effect.

జీమన్ ఫలితాన్ని వివరించండి?

3 How inter nuclear distance in a molecule can be determined

న్యూక్లియర్ అంతర్గత దూరం ఏ విధంగా కనుగొనవచ్చను.

4. Define Binding energy of nucleus. Calculate binding energy of nucleus.

కేంద్రక బంధన శక్తిని వివరింపుము. దానిని ఏ విధంగా లెక్కగడతారో తెలుపుము

5. What are properties of nuclear forces.

కేంద్రకబలాల దర్మాలను తెలుపుము.

6. Write about Geiger-Nuttal law

గైగర్ ... నట్టల్ నియమాన్ని వివరించండి.

7. Briefly explain the principle of solid state detector.

సలాడ్ స్టేట్ డిటెక్టర్ పనిచేయు విధానాన్ని వివరించండి?

8. The mass of $_{17}Cl^{35}$ is 34.98 a.m.u. Find the binding energy per nucleon. Mass of neutron is 1.008665 a.m.u and mass of proton is 1.007665 a.m.u.

$_{17}Cl^{35}$ యొక్క ద్రవ్యరాశి 34.98 a.m.u. న్యూట్రాన్ ద్రవ్యరాశి 1.008665 a.m.u మరియు ప్రోటాన్ ద్రవ్యరాశి 1.007665 a.m.u. బంధన శక్తి ప్రతి న్యూక్లియాన్ ను కనుగొనుము.

Section – B

Answer **all** questions. 5 x 10 = 50 m.

9. a. Describe the Stern Gerlach experiment and indicate the importance of the results obtained.

స్టెర్న్ గెర్లాక్ ప్రయోగమును వివరించి ప్రాధాన్యతను తెలుపండి?

OR

b. Explain Raman effect. Describe experimental arrangement to observe Raman effect.

రామన్ ప్రయోగ ఫలితాన్ని ప్రయోగ పూర్వకంగా వివరించండి?

10. a. Describe Davision and Germer Experiment.

డెవిసన్ మరియు జర్మర్ ప్రయోగాన్ని తెలుపండి?

OR

b. Describe Heisenbergs Uncertanity relation. Derive Energy – time uncertainty.

ఐసెన్ బర్గ్ అనిశ్చిత సూత్రాన్ని వివరించి శక్తి, కాలముల అనిశ్చిత సూత్రాన్ని నిరూపించండి?

11 a.Derive an expression for energy levels of particle in box which is 3-D motion.

పెట్టెలో 3-D చలనం కలిగిన కణం యొక్క శక్తి సూత్రాన్ని ఉత్పాదన చేయండి?

OR

b. Derive Schodinger time dependent wave equation.

స్కాడింజర్ కాల సమీకరణాన్ని ఉత్పాదించండి?

12. a. Explain Liquid drop model of nuclus.

ద్రవ బిందు నమోనా గురించి వివరించండి?

OR

b. Explain the construction and working of GM counter.

GM కౌంటర్ నిర్మాణము పనిచేయు విధానాన్ని తెలపండి?

13. a. Explain about type -1 and type -2 superconductors and write brief about BCS theory.

1 వ రకం - 2 వ రకం అతివాహక పదార్థాల గురించి వివరించి BCS సిద్ధాంతమును వ్రాయండి?

OR

b. Explain the distinct properties of nano materials.

నానో పదార్థాల యొక్క ధర్మాలను వివరించండి?