



BA/BCOM/BSc/BVoc PROGRAM (4 years Honors)
Draft proforma for Syllabus framing
2020-21

SUBJECT
PHYSICS

Members of BOS(Contact details)		
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Note: BOS is to provide final 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 papers 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/ Paper-setters / CS/ Paper Evaluator.
8. List of paper-setters/ Paper 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 Papers 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 papers setters and others.
8. List of paper setters is approved by BOS.
9. Panel of examiners is also approved by BOS.

**2. DETAILS OF PAPER TITLES & CREDITS**

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

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 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, Prism, 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 apparatus, 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 /paper setters/Exam-Chief Superintendent

1. Follow the syllabus prescribed by BoS and see that no deviation.
2. Questions in paper 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

BSc	PHYSICS
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1. Aim and objectives of UG program in Subject:

To align with emerging and employment areas.

2. Learning outcomes of Subject (in consonance with the Bloom's Taxonomy):

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 its applications and the precessional 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 motion and 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 out the 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 Fraunhofer 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.
- Explain about the different aberrations in lenses and discuss the methods of minimizing them.
- Understand the basic principles of fibreoptic communication and explore 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-Boltzmann 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 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

- 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 liquefy air 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 and interaction.
- ❖ 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

----- NO -----

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 papers) on topics relating to:

Quiz Programmes on: R Individual 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 paper-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:

4.Details of course-wise Syllabus

BSc	Physics (Semester: I)	Credits: 3
Paper: 1	Mechanics, Waves and Oscillations	Hrs/Wk: w

1. Aim and objectives of Course (Title of the course/paper):

----- Mentioned earlier -----

6. Learning outcomes of Course (in consonance with the Bloom's Taxonomy):

----- Mentioned earlier -----

7. Detailed Syllabus: (Five units with each unit having 12 hours of class work)



UNIT-I:

1.Mechanics of Particles (5 hrs)

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.

2. Mechanics of Rigid bodies (7 hrs)

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:

3. Motion in a Central Force Field (12hrs)

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:

4. Relativistic Mechanics (12hrs)

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:

5. Undamped, Damped and Forced oscillations: (08 hrs)

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.

6. Coupled oscillations: (05Hrs)

Coupled oscillators - introduction , Two coupled oscillators, Normal coordinates



and Normal Modes.

Unit-V:

6. Vibrating Strings: (07 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.

7. Ultrasonics: (05 hrs)

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



Recommended Text Books:

Reference books:

REFERENCE BOOKS:

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



8. 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.

Recommended Text books:

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)

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 papers) 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 piezoelectric and magnetostriction methods, Detection of ultrasonics

B. General

1. Collection of news reports and maintaining a record of paper-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.

10. Recommended Continuous Assessment methods:

BSc/BA/BCom	Physics (Semester: 2)	Credits: 3
Paper: 2	Wave Optics	Hrs/Wk: 4

2. Aim and objectives of Course (Title of the course/paper):

----- Mentioned Earlier -----

11. Learning outcomes of Course (in consonance with the Bloom's Taxonomy):

----- Mentioned Earlier -----

12. Detailed Syllabus: (Five units with each unit having 12 hours of class work)



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 and determination of wavelength.

UNIT-II Diffraction of light:(12hrs)

Introduction, Types of diffraction: Fresnel and Fraunhofer diffractions, Distinction between Fresnel and Fraunhofer diffraction, Fraunhofer 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



Recommended Text Books:

Reference books:

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



13. 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 deviation method.
6. Determination of wavelength of light using diffraction grating-normal incidence method.
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 Text books:

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)

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 Fraunhofer diffraction, Fraunhofer 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 papers) on topics relating to: Interference, Abberations, Optical fiber communication, Holography, Diffraction, Polarization, Lasers.
7. Quiz Programmes on: Interference, Diffraction, Polarization, Optical fibers, Lasers, Abberations
8. Individual Field Studies/projects:
9. Group discussion on: Interference, Diffraction, Polarization
10. Group/Team Projects on: Lasers, Optical fibers

D. General

5. Collection of news reports and maintaining a record of paper-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.

15. Recommended Continuous Assessment methods:

BSc	(Semester: 3)	Credits: 3
Paper: 1	Heat and thermodynamics	Hrs/Wk: 4

3. Aim and objectives of Course (Title of the course/paper):

----- Mentioned earlier -----



16. Learning outcomes of Course (in consonance with the Bloom's Taxonomy):

----- Mentioned earlier -----

17. Detailed Syllabus: (Five units with each unit having 12 hours of class work)



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 $C_P - C_V$ (iii) Value of C_P/C_V (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 substances at low temperatures.

UNIT-V: Quantum theory of radiation: (12 hrs) Blackbody and its spectral energy distribution of black body radiation, Kirchoff's law, Wein's displacement



law, Stefan-Boltzmann's 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 Angstrompyroheliometer, Estimation of surface temperature of Sun.



Recommended Text Books:

Reference books:

- ❖ BSc Physics, Vol.2, Telugu Akademy, Hyderabad
- ❖ Thermodynamics, R.C.Srivastava, S.K.Saha&AbhayK.Jain, Eastern Economy Edition.
- ❖ Unified Physics Vol.2, Optics & Thermodynamics, Jai PrakashNath&Co.Ltd., Meerut
- ❖ Fundamentals of Physics. Halliday/Resnick/Walker.C. Wiley India Edition 2007
- ❖ Heat and Thermodynamics -N BrijLal, P Subrahmanyam, S.Chand& Co.,2012
- ❖ Heat and Thermodynamics- MS Yadav, Anmol Publications Pvt. Ltd, 2000
- ❖ University Physics, HD Young, MW Zemansky,FW Sears, Narosa Publishers, NewDelhi



18. 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.



Recommended Text books:

Recommended Reference books:

19. 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 from thermodynamic potentials, 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

11. Student seminars (Individual presentation of papers) 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,
12. Quiz Programmes on: Kinetic theory of gases, Heat and Temperature entropy, Isothermal and Adiabatic process, Thermodynamic Potentials, Low temperature Physics, Thermal Radiation.
13. Individual Field Studies/projects: Carnots Engine, Pyrometers, Adiabatic demagnetization, Porus plug experiment. Liquefaction of gases.
14. Group discussion on: Kinetic theory of gases, Quantum theory of Radiation, Low temperature physics and thermodynamic potentials,
15. Group/Team Projects on: Carnots Engine, Pyrometers, Adiabatic demagnetization, Porus plug experiment. Liquefaction of gases.

F. General



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

20. Recommended Continuous Assessment methods:

BSc/BA/BCom	Subject (Semester: 4)	Credits: 3
Paper: 4	Electricity, Magnetism & Electronics	Hrs/Wk: 4

4. Aim and objectives of Course (Title of the course/paper):

-----Mentioned earlier -----

21. Learning outcomes of Course (in consonance with the Bloom's Taxonomy):

----- Mentioned earlier -----

22. Detailed Syllabus: (Five units with each unit having 12 hours of class work)



UNIT-I

1. 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.

2. 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

3. 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.

4. 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

5. 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.

6. 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 and proof). Velocity of wave equation using Maxwell's relations in vacuum.



UNIT-IV

7. Basic Electronic devices: (12 hrs)

PN junction diode, Zener diode and Light 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 characteristics of a transistor in CE mode, Relation between α , β and γ ; Transistor as an amplifier.

UNIT-V:

8. 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.



Recommended Text Books:

Reference books:

REFERENCE BOOKS

- ❖ BSc Physics, Vol.3, Telugu Academy, Hyderabad.
- ❖ Electricity and Magnetism, D.N. Vasudeva. S. Chand & Co.
- ❖ Electricity and Magnetism, B.D.Duggal and C.L.Chhabra. Shobanlal& Co.
- ❖ Electricity, Magnetism with Electronics, K.K.Tewari, R.Chand& Co.,
- ❖ Electricity and Magnetism, R.Murugesan, S. Chand & Co.
- ❖ Principles of Electronics, V.K. Mehta, S.Chand& Co.,
- ❖ Digital Principles and Applications, A.P. Malvino and D.P.Leach, McGrawHillEdition.



23. 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 Text books:

Recommended Reference books:



24. 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:

16. **Assignments on:** Gauss's law-Statement and its proof, Electric field intensity due to uniformly charged solid sphere and Potential due to a uniformly charged sphere.

17. **Student seminars (Individual presentation of papers) on topics relating to:**

18. 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

19. **Quiz Programmes on:** PN junction diode, Zener diode and Light Emitting Diode (LED) and their I-V characteristics, Zener diode as a regulator- Transistors and its operation, CB, CE and CC configurations

20. **Individual Field Studies/projects:** Maxwell's equations-Derivation, Maxwell's wave equation (with derivation), Transverse nature of electromagnetic waves, Poynting theorem (Statement and proof)

21. **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

22. **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

13. Collection of news reports and maintaining a record of paper-cuttings relating to topics covered in syllabus

14. Group Discussions on:

15. Watching TV discussions and preparing summary points recording personal observations etc., under guidance from the Lecturers

16. Any similar activities with imaginative thinking.

Recommended Continuous Assessment methods:

BSc	(Semester: 4)	Credits: 3
Paper: 1	Modern Physics	Hrs/Wk: 4

5. Aim and objectives of Course (Title of the course/paper):



----- Mentioned Earlier -----

25. Learning outcomes of Course (in consonance with the Bloom's Taxonomy):

----- Mentioned Earlier -----

26. Detailed Syllabus: (Five units with each unit having 12 hours of class work)



UNIT-I :

1. 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, Experimental arrangement 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:

2. 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:

3. 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 (Infinite Potential Well) and (ii) three dimensional box - tunneling effect.

UNIT-IV:

4. 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:

5. 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).

6. 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



Recommended Text Books:

Reference books:

REFERENCE BOOKS

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



27. 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 vacuum diode.
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 Text books:

Recommended Reference books:



28. 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 papers) 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,;

22. **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.

23.Individual Field Studies/projects: *Nuclear Radiation detectors:* G.M. Counter, Cloud chamber, Solid State detector, Liquid drop model, Distinct properties of nano materials

24.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(Infinite Potential Well), Liquid drop model, The Shell model, Magic numbers

- 25. 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

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

Recommended Continuous Assessment methods:



21. MODEL QUESTION PAPER (Sem-end. Exam)

BSc	Physics (Semester: I)	Max. Marks:
Paper: 1	Mechanics, waves and oscillations	3Hrs

ADIKAVI NANNAYA UNIVERSITY

RAJAHMAHENDRAVARAM

I B.Sc., Semester – I (Model paper)

PHYSICS - Paper I

(MECHANICS& WAVES AND OSCILLATIONS)

w.e.f. 2020-21

Time : 3 Hours

Max Marks : 75

Section – A

Answer any 5 questions.

5 x 10 = 50M

1. 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

2. 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

3. a) Describe Michelson's-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

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

సందిగ్ధ తీగలో విరుద్ధ డోలనాల అవకలన సమీకరణమును సాధించుము

OR

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

ద్వంద్వ యుగ్మక డోలనాల సమీకరణమును సాధించుము

- 5 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. ఇరువైపులా తిగించబడ్డ తీగలోని కంపనాలను వివరించుము

OR

- b) Explain the production of Ultrasonics using Piezo electric method.

పైజో విద్యుత్ వద్దతి ద్వారా అతి ధ్వనులు ఉత్పాదనమును వివరించుము



SECTION-B

ANSWER ANY FIVE QUESTIONS

5 X 4 =20M

6.Explain the terms

1) impact parameters

అధిపాత పరామితి

2)Scattering Cross Section.How the angle of scattering does depends on the Impact Parameter

పరిక్షేపణ మధ్యచ్ఛేదము. పరిక్షేపణ కోణము ఏ విధంగా అధిపాత పరామితి మీద ఏ విధంగా ఆధారపడుతో వివరించుము

7)Write a short note on Gyroscope

గైరోస్కోప్ ను వివరించుము

8)Show the conservative nature of central forces

కేంద్రీయ బలాల యొక్క నిత్యత్వమును చూపుము

9)Give brief idea about GPS

జి.పి.యస్ గురించి క్లుప్తంగా వ్రాయుము

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

0.6 వేగముతో చలించుచున్న కడ్డి యొక్క సంకుచితత్వము యొక్క శాతమును కనుగొనుము

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

పైజో స్పటికము యొక్క ప్రాథమిక పౌనఃపున్యమును కనుగొనుము

13)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 $V=3000\text{m/s}$ and the density of the material of the bar $p=8600\text{kg/ m}^3$

మధ్యన బింగించబడిన 1మీటర్ కడ్డిలోని అనుదైర్ఘ్య తరంగ ప్రాథమిక పౌనఃపున్యమును కనుగొనుము.కడ్డిలో ధ్వని వేగము $V=3000\text{m/s}$ కడ్డి లోహ సాంద్రత $p=8600\text{kg/ m}^3$

14)A particle executes simple harmonic motion with a period of 1 sec and amplitude 0.1m. Find the maximum velocity and acceleration

సరళహారాత్మక చలనము చేయుచున్న ఒక కణము యొక్క కాలపరిమితి 1 సెకన్ మరియు కంపన పరిమితి 0.1 మీటర్ దాని గరిష్ట వేగమును మరియు గరిష్ట త్వరణమును రాబట్టుము

15) Write five applications of Ultrasonic

అతిధ్వనుల యొక్క అనువర్తనాలను ఐదు వ్రాయుము



MODEL QUESTION PAPER (Sem-end. Exam)

BSc	Physics (Semester: 2)	Max. Marks: 75
Paper: 2	Wave Optics	3Hrs

I B.Sc., Semester – II (Model Paper)

w.e.f. 2020-21

PHYSICS – PAPER II (Model Paper)

WAVE OPTICS

Time: 3 Hrs.

Max. Marks: 75

Section – A

Answer any **FIVE** questions.

5 x 10 M= 50M

1. 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.

2. 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 తరంగదైర్ఘ్యాన్ని 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.

3. 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 వ్యాభ్యాంతరము కల కుంభాకార కటకము వలె పనిచేయునని చూపుము.

- b. Explain diffraction of light due to single slit.

ఏకరీతి చీలిక వల్ల ఏర్పడు వివర్తనమును వివరింపుము.

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

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





ధ్రువణ తల భ్రమణము అనగా నేమి. లారెంట్ అర్థభాయ ద్రువణ మాపకము ద్వారా బ్రామకమును ఎలా కనుగొందువు.

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

హీలియం-నియాన్ లేజరు యొక్క నిర్మాణము మరియు పనిచేయు విధానము వివరింపుము

OR

b.Describe parts of laser and explain working of Ruby laser.

హీలేజర్ భాగమునని వ్రాసి, రూబీ లేజరు పనిచేయు విధానము వివరింపుము

Section – B

Answer any **FIVE** questions.

5 x 4M = 20M

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

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

7. Explain about Resolving power of grating

గ్రేటింగ్ వృధక్యరణ సామర్థ్యం వివరించుము.

8. Distinguish between Fresnel and Fraunhofer diffractions.

ఫ్రెనెల్ మరియు ఫ్రాన్ హెఫర్ వివర్తనముల వ్యత్యాసము వ్రాయుము.

9. What are quarter and half wave plates?

అర్థతరంగ మరియు క్వాటర్ తరంగ పలక వివరింపుము.

10. What is holography? Mention its uses.

హెలోగ్రఫీ అనగా నేమి. దాని ఉపయోగాలు వ్రాయుము.

11. 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 వ్యాసార్థాలు 10 సెం. 40 సెం. ఎరుపు మరియు ఉదారంగుల వక్రీభవన గుణకములు 1.52 మరియు 1.51. వస్తువు అనంతదూరంలో ఉన్నప్పుడు అనుదైర్ఘ్య వర్ణ విపదనము కనుగొనుము.

12. 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 సెం. మందము 1.5 వక్రీభవన గుణకము గల కటకము గాలిలో ఉన్నప్పుడు దాని వక్రతల వ్యాసార్థము 8. సెం. నాభ్యాంతరము మరియు మాత్రికను కనుగొనుము.

13. In Young's experiment with sodium light of $\lambda = 5.9 \times 10^{-5}$ cm, the distance between the slits is 1 mm. What is the fringe width of the interference pattern on the screen, 100cm away from the slit?

2 యంగ్ ప్రయోగము నందు సోడియం లైట్ యొక్క తరంగ దైర్ఘ్యము $\lambda = 5.9 \times 10^{-5}$ cm, నుండియు 2 సీట్ల మధ్య దూరము 1 mm తెగ దూరము 100cm వ్యత్యాసము ఏమి?



2 చెక్కర ధ్రువణము 15 సెమ్ గొట్టంలో దృశ్య భ్రమణము 7° చూపగా ఆ ధ్రువణము యొక్క సామర్థ్యమును లెక్కించుము.

15. In Newton's rings arrangement the radius of curvature of the curved surfaces is 50 cm. The radii of the 9th and 16th 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 వ్యాసార్థాలు 0.18 cm and 0.2235 cm. వక్రతల వ్యాసార్థము 50 cm అయినచోకాంతి యొక్క తరంగదైర్ఘ్యము లెక్కించుము.



MODEL QUESTION PAPER (Sem-end. Exam)

BSc	Physics (Semester: 3)	Max. Marks: 75
Paper: 3	Heat & Thermodynamics	3Hrs

II B.Sc., SEMESTER - III EXAMINATION

PHYSICS – PAPER III (Model Paper)

HEAT AND THERMODYNAMICS -2020– 2021

Time : 3 Hrs.

Max. Marks : 75

Section - A

Answer all questions.

5x 10M = 50M

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

మాక్స్ వెల్ వేగ వితరణ సూత్రాన్ని రాబట్టుము

OR

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

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

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

ప్లాంక్ వికిరణ సూత్రాన్ని రాబట్టుము, శక్తి వితరణ సూత్రాన్ని వివరించుము

OR

b. Explain the construction and working of PyroHelio meter.

పైరోహీలియో మీటర్ యొక్క నిర్మాణము మరియు పనితీరును వ్రాయుము

3. a. Describe the working of Carnot's engine and derive the expression for its efficiency.

కార్నో ఇంజను పనితీరును మరియు దాని సామర్థ్యమును ఉత్పాదించుము

OR

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

T-S పటమును వివరించి దాని సామర్థ్యమును ఉత్పాదించుము

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

ఉష్ణగతిక శక్తాలను నిర్వచించుము, తద్వారా మాక్స్ వెల్ ఉష్ణగతిక సమీకరణాన్ని రాబట్టండి

OR

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

జౌల్ - థామ్సన్ ఫలితమును వివరించుము. జౌల్ - థామ్సన్ శీతలీకరణానికి సమీకరణాన్ని రాబట్టండి

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

Give the

స్థిరోష్ణక నిరయస్కాంతీకరణం ద్వారా అల్పఉష్ణోగ్రతలను ఏ విధంగా పొందవచ్చునో వివరించుము

OR

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

లిండే పద్ధతి ద్వారా వాయుద్రవీకరణము వివరించుము



Section – B

Answer any **FIVE** questions.

5 x 5M = 25M

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

వాయుస్థిగ్గతాగుణకమును అణుచలన సిద్ధాంతం ద్వారా రాబట్టము

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

మాయప్రేరేయే తీగ దృశ్య ప్రేరోమీటర్ నిర్మాణమును వివరించుము

8. State and prove carnot's theorem

కార్నాడ్ సిద్ధాంతంను వ్రాసి వివరించుము

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

మాక్స్వెల్ సమీకరణం ద్వారా క్లాసియస్-క్లాపెరాన్ సమీకరణమును ఉత్పాదించుము

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

ఓజోన్ పొర మీద క్లోరో-ఫ్లోరో కార్బన్ల యొక్క చర్య వివరించుము

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

ఎంట్రోపీని వివరింపుము. ఉత్క్రమణీయ ప్రక్రియలో దాని మార్పును వివరించుము

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

కార్నో ఇంజను యొక్క సామర్థ్యం 60%. దాని సామర్థ్యం 70% అయితే ఉష్ణఉత్పాదక లోని ఉష్ణోగ్రత పెరుగుదల ఎంత

13. 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 = $5.7 \times 10^{-8} \text{ Wm}^{-2}\text{K}^{-4}$.

సూర్యుని ఉపరితల ఉష్ణోగ్రతను లెక్కించుము. సూర్యుని వ్యాసార్థం $7.04 \times 10^5 \text{ Km}$ భూమి నుండి సూర్యునికి గల దూరం $14.72 \times 10^7 \text{ Km}$ సౌర

స్థిరాంకం 1400 W/m^2 మరియు స్టెఫాన్ స్థిరాంకం $5.7 \times 10^{-8} \text{ Wm}^{-2}\text{K}^{-4}$

14. Find the wave length at which maximum energy is radiated by a black body at a temperature of 227°C . Wein's constant = $3 \times 10^{-3} \text{ m-K}$.

కృష్ణ వస్తువు 227°C ఉష్ణోగ్రత వద్ద వెలువరించే విశిరణము యొక్క తరంగదైర్ఘ్యము కనుగొనుము. వీన్ స్థిరాంకం $3 \times 10^{-3} \text{ m-K}$.

15. Write a short note on temperature of sun.

సూర్యుని ఉష్ణోగ్రత గురించి వ్రాయండి



MODEL QUESTION PAPER (Sem-end. Exam)

BSc	Physics (Semester: 4)	Max. Marks: 75
Paper: 4	Electricity, Magnetism & Electronics	3Hrs

AdiKavi Nanayya University::Rajamahendravaram

III B.Sc.: Physics SemesterIV- Paper IV

Electricity, Magnetism and Electronics

- (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 కెపాసిటన్స్ ని ఉత్పాదించుము?
- (a) State and explain Biot - Savart's law. Derive an expression for the magnetic induction at a point on the axis of a current carrying solenoid.
బయోట్-సావర్ట్ నియమమును వివరించుము? సాలినాయిడ్ లో విద్యుత్ ప్రవాహస్తున్నట్లు 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.
- (a) Describe the behavior of series LCR circuit when an alternating voltage is applied to it. Explain the condition for resonance.
ఎల్సీఆర్. 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.
- (a) What is transistor? Explain the working of PNP and NPN Transistor.
పి.ఎన్.పి మరియు ఎన్.పి.ఎన్ ట్రాన్సిస్టర్ యొక్క పనితీరు వివరించుము?
(or)
(b) Deduce relation between alpha, beta and gamma.
ఆల్ఫా, బీటా, మరియు గామా ల మధ్య సంబంధము వ్రాయుము.
- (a) Explain the functioning of a Half Adder and a Full Adder along with respective truth tables.
అర్థ సంకలన కారిణి (హాఫ్ యాడర్) మరియు పూర్ణ యాడర్ల యొక్క నిజ పట్టికల ద్వారా వీటి యొక్క పనితీరు వివరించుము?
(or)
(b) State and prove Demorgan's laws. Realize AND, OR and NOT gates from NAND logic.
డీ- మార్గన్ సిద్ధాంతమును నిర్వచించి నిరూపించుము? ఎన్ఎఎన్డి ద్వారము ద్వారా అండ్, ఒఆర్, నాట్ ద్వారాలను రాబట్టుము.



Section – B

Answer any FIVE Questions

5X4 =20M

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

బిందు ఆవేశము వలన కలిగే పొటెన్షియల్‌ను ఉత్పేదించుము?

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

హాల్ ఫలితము అనగా నేమి. దాని అనువర్తనాలను వ్రాయుము.

8. Derive an expression for the self-inductance of a long solenoid.

స్వయం ప్రేరిత సాలీనాయిడ్ యొక్క సిద్ధాంతము వ్రాయుము?

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

మాక్స్‌వెల్ నియమాల ఇంటిగ్రల్ మరియు సంకలన రూపములు వ్రాయుము?

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

డి.ఇ.పి మధ్య గల సంబంధము వ్రాయుము?

11. Calculate the resonance frequency of a LCR series circuit with a resistance 10Ω , inductance 20mH and a capacitance of $0.02\mu\text{F}$.

ఎల్ సి.ఆర్ వలయం యొక్క అనునాద పౌనపున్యమును కనుగొనుము నిరోధము 10Ω , ఇండక్టెన్స్ 20mH $c= 0.02\mu\text{F}$.

12. 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?

13. 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

14. 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. $11110111 - 00001100$

15. Define power factor and Q factor.

గుణభాజకము మరియు సామర్థ్య భాజకము (పి.ఎఫ్) వివరింపుము?



MODEL QUESTION PAPER (Sem-end. Exam)

BSc	Physics (Semester: 4)	Max. Marks: 75
Paper: 5	Modern Physics	3Hrs

AdiKavi Nanayya University::Rajamahendravaram

II B.Sc.: Physics Semester IV

PAPER V

MODEREN PHYSICS

(Model Paper)

w.e.f. 2020-21

Time: 3 Hrs.

Max. Marks: 75

Section – A

Answer any **all** questions.

5 x 10 = 50 m.

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

స్టేర్న్ గెర్లాక్ ప్రయోగమును వివరించి ప్రాధాన్యతను తెలుపండి?

OR

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

రామన్ ప్రయోగ ఫలితాన్ని ప్రయోగ పూర్వకంగా వివరించండి?

2. a. Describe Davison and Germer Experiment.

డేవిసన్ మరియు జర్మర్ ప్రయోగాన్ని తెలుపండి?

OR

- b. Describe Heisenbergs Uncertainty relation. Derive Energy – time uncertainty.

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

3. 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 Schrodinger time dependent wave equation.

స్కాడింజర్ కాల్ సమీకరణాన్ని ఉత్పాదించండి?

4. a. Explain Liquid drop model of nucleus.

ద్రవ బిందు నమోనా గురించి వివరించండి?

OR

b. Explain the construction and working of GM counter.

GM కౌంటర్ నిర్మాణము పనిచేయ విధానాన్ని తెలపండి?

5. 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?

Section – B

Answer any **FIVE** Questions

5X4 =20M

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

L-S మరియు J-J కప్లింగ్ పద్ధతులను వివరించండి.

7.State and explain Zeeman effect.

జీమన్ ఫలితాన్ని వివరించండి?



8. How inter nuclear distance in a molecule can be determined

న్యూక్లియర్ అంతర్గత దూరం ఏ విధంగా కనుగొనవచ్చును.

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

కేంద్రక బంధన శక్తిని వివరింపుము. దానిని ఏ విధంగా లెక్కగడతారో తెలుపుము

10. What are properties of nuclear forces.

కేంద్రకబలాల దర్మాలను తెలుపుము.

Section – C

Answer any **FIVE** Questions

5X4 =20M

11. Write about Geiger-Nuttal law

గైగర్ ... నట్టల్ నియమాన్ని వివరించండి.

12. Explain briefly the concept of compound nucleus.

సంయుక్త కేంద్రకము యొక్క విశిష్టతను వ్రాయుము?

13. Briefly explain the principle of solid state detector.

సలాడ్ స్టేట్ డిటెక్టర్ పనిచేయు విధానాన్ని వివరించండి?

14. The mass of $_{17}\text{Cl}^{35}$ 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.

$_{17}\text{Cl}^{35}$ 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.

15. The exciting line in an experiment is 5460 \AA and the stokes line is at 5520 \AA

Find the wavelength of anti-stokes line.'

ఉద్ఘాత రేఖ తరంగదైర్ఘ్యము 5460 \AA బమరియు స్టోక్ రేఖ తరంగదైర్ఘ్యము 5520 \AA ప్రతి స్టోక్ రేఖ తరంగదైర్ఘ్యము కనుగొనుము.

16. A nucleus of mass number 125 has radius 6 fermi. Find the radius of nucleus having mass number 64.

కేంద్రకము యొక్క ద్రవ్యరాశి సంఖ్య 125 వ్యాసార్థము 6 పెర్మి. కేంద్రకము ద్రవ్యరాశి 64 యొక్క వ్యాసార్థము కనుగొనుము.



BSc	Subject (Semester: V)	Credits:
Paper:5	(Course title)	Hrs/Wk:

1. Aim and objectives of Course (Title of the course):
2. Learning outcomes of Course (in consonance with the Bloom's Taxonomy):
3. Detailed Syllabus: Five units (i.e., each unit having 12 hours of class work)

Unit-1

Unit-2

Unit-3

Unit-4

Unit-5

Recommended Text Books:

Reference books:

4. Details of Lab/Practical/Experiments/Tutorials syllabus:

Recommended Text books:

Recommended Reference books:

5. 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 papers) on topics relating to:
 3. Quiz Programmes on:
 4. Individual Field Studies/projects:
 5. Group discussion on:
 6. Group/Team Projects on:
- B. General
1. Collection of news reports and maintaining a record of paper-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.
6. Recommended Continuous Assessment methods: