

Table-8: B.Sc., SEMESTER – II

Sno	Course	Total Marks	Mid Sem Exam	Sem End Exam	Teaching Hours	Credits
1	First Language (Tel/Hin/Urdu/Sans...)	100	25	75	4	3
2	Second Language English	100	25	75	4	3
3	<i>Foundation course - 3</i> Environmental Sci	50	0	50	2	2
4	<i>Foundation course – 4A</i> ICT – 1 (Information & Communication Technol)	50	0	50	2	2
5	DSC* 1 B (Group Sub- 1)	100	25	75	4	3
6	DSC 1 B Lab Practical	50	0	50	2	2
7	DSC 2 B (Group Sub- 2)	100	25	75	4	3
8	DSC 2 B Lab Practical	50	0	50	2	2
9	DSC 3 B (Group Sub- 3)	100	25	75	4	3
10	DSC 3 B Lab Practical	50	0	50	2	2
	Total	750	-	-	30	25

B.Sc. Table-9: B.Sc., SEMESTER – III

Sno	Course	Total Marks	Mid Sem Exam	Sem End Exam	Teaching Hours	Credits
1	First Language (Tel/Hin/Urdu/Sans...)	100	25	75	4	3
2	Second Language English	100	25	75	4	3
3	<i>Foundation Course - 5</i> Entrepreneurship	50	0	50	2	2
4	<i>Foundation course -2B</i> Communication & Soft Skills -2	50	0	50	2	2
5	DSC 1 C (Group Sub- 1)	100	25	75	4	3
6	DSC 1 C Practical	50	0	50	2	2
7	DSC 2 C (Group Sub- 2)	100	25	75	4	3
8	DSC 2 C Practical	50	0	50	2	2
9	DSC 3 C (Group Sub- 3)	100	25	75	4	3
10	DSC 3 C Practical	50	0	50	2	2
	Total	750	-	-	30	25

Table-10: B.Sc., SEMESTER – IV

Sno	Course	Total Marks	Mid Sem Exam*	Sem End Exam	Teaching Hours**	Credits
1	<i>Foundation Course – 2C*</i> Communication & Soft Skills -3	50	0	50	2	2
2	<i>Foundation Course – 6*</i> Analytical Skills	50	0	50	2	2
3	<i>Foundation Course - 7 **</i> CE (Citizenship Education)	50	0	50	2	2
4	<i>Foundation course – 4B</i> ICT – 2 (Information & Communication Technol)	50	0	50	2	2
5	DSC 1 D (Group Sub- 1)	100	25	75	4	3
6	DSC 1 D Lab Practical	50	0	50	2	2
7	DSC 2 D (Group Sub- 2)	100	25	75	4	3
8	DSC 2 D Lab Practical	50	0	50	2	2
9	DSC 3 D (Group Sub- 3)	100	25	75	4	3
10	DSC 3 D Lab Practical	50	0	50	2	2
	Total	750	-	-	30	25

*To be taught by English Teachers (and partly by Maths/Stat Teachers)

** To be taught by Telugu Teachers

**SEMESTER PATTERN UNDER CHOICE BASED CREDIT SYSTEM
COMMON CORE SYLLUBUS B.Sc. PHYSICS**

Second Semester

Paper II: Waves & Oscillations

Practical 2 (Lab2)

Third Semester

Paper III: Wave Optics

Practical 3.(Lab 3)

Fourth Semester

Paper IV: Thermodynamics & Radiation Physics

Practical 4.(Lab 4)

NOTE: Problems should be solved at the end of every chapter of all Units.

1. Each theory paper is of 100 marks and practical paper is also of 50 marks.
Each theory paper is 75 marks university exam (external) + 25 marks mid sem Exam
Each practical paper is 50 marks external
2. The teaching work load per week for semesters I to VI is 4 hours per paper for theory and 2 hours for all lab practicals.
3. The duration of the examination for each theory paper is 3.00 hrs.
4. The duration of each practical examination is 3 hrs with 50 marks, which are to be distributed as
30 marks for experiment
10 marks for viva
10 marks for record

<u>Practicals</u>	50 marks
Formula & Explanation	6
Tabular form +graph +circuit diagram	6
Observation	12
Calculation, graph, precautions & Result	6
Viva-Voce	10
Record	10

*****NOTE: Practical syllabus is the same for both Mathematics and Non Mathematics combinations**

B.Sc. (Physics) (Maths Combinations)

Scheme of instruction and examination to be followed w.e.f. 2015-2016

S. No	Semester	Title of the paper	Instruction hrs/ week	Duration of exam(hrs)	Max Marks (external)
Theory					
1	First	Paper I: Mechanics & Properties of Matter	4	3	75
2	Second	Paper II: Waves & Oscillations	4	3	75
3	Third	Paper III: Wave Optics	4	3	75
4	Fourth	Paper IV: Thermodynamics & Radiation Physics	4	3	75
5	Fifth	Paper V: Electricity & Magnetism	4	3	75
		Paper VI: Atomic Physics & Quantum mechanics	4	3	75
6	Sixth	Paper VII : Digital and Analog Electronics	4	3	75
		Paper VIII: Nuclear physics & Solid State Physics	4	3	75
Practical					
1	First	Practical I	2	3	50
2	Second	Practical II	2	3	50
3	Third	Practical III	2	3	50
4	Fourth	Practical IV	2	3	50
5	Fifth	Practical V	2	3	50
6	Sixth	Practical VI	2	3	50
7	Seventh	Practical VII	2	3	50
8	Eighth	Practical VIII	2	3	50

Model question Paper for all theory papers

Time : 3 hrs

Max marks : 75

Section A

Answer any five out of 8 questions from all units (I to V)

Marks: 5 x 5 = 25

Section B

Answer All questions with internal choice from all units (I to V) Marks : 5 x 10 = 50

****** At least three problems must be included each with a weightage of 5 marks**

SEMESTER PATTERN UNDER CHOICE BASED CREDIT SYSTEM

COMMON CORE SYLLUBUS

B.Sc. 1st Semester Physics

Paper I: Mechanics & Properties of Matter

(For Maths Combinations)

Work load: 60 hrs per semester

4 hrs/week

UNIT I (10 hrs)

1. Vector Analysis

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

UNIT II (10 hrs)

2. Mechanics of particles

Laws of motion, motion of variable mass system, motion of a rocket. Conservation of energy and momentum. Collisions in two and three dimensions. Concept of impact parameter, scattering cross-section. Rutherford scattering-derivation.

UNIT III (16 hrs)

3. Mechanics of Rigid bodies : 8 hrs

Definition of rigid body, rotational kinematic relations, equation of motion for a rotating body, angular momentum. Euler equation, precession of a top. Gyroscope, precession of the equinoxes.

4. Mechanics of continuous media : 8 hrs

Elastic constants of isotropic solids and their relation, Poisson's ratio and expression for Poisson's ratio in terms of ν , n , k . Classification of beams, types of bending, point load, distributed load, shearing force and bending moment, sign conventions.

UNIT IV (12Hrs)

5. Central forces

Central forces, definition and examples, characteristics of central forces, conservative nature of central forces, conservative force as a negative gradient of potential energy, equation of motion under a central force. Derivation of Kepler's laws. Motion of satellites.

UNIT V (12 hrs)

6. Special theory of relativity

Galilean relativity, absolute frames. Michelson-Morley experiment, negative result. Postulates of special theory of relativity. Lorentz transformation, time dilation, length contraction, addition of velocities, mass-energy relation. Concept of four-vector formalism.

TEXT BOOKS

1. BSc Physics Vol.1, Telugu Academy, Hyderabad

2. Mechanics & Properties of Matter, J.C. Upadhyaya, *Himalaya Publishing House, Mumbai, 2015.*
3. Unified Physics Vol.1, Mechanics, Waves & Oscillations, S.L.Gupta and Sanjeev Gupta, Jai Prakash Nath & Co., Meerut

REFERENCE BOOKS:

1. Fundamentals of Physics Vol. I - Resnick-Halliday-Krane, *Wiley India 2007*
2. College Physics-I. T. Bhimasankaram and G. Prasad. *Himalaya Publishing House.*
3. University Physics-FW Sears, MW Zemansky & HD Young, *Narosa Publications, Delhi*
4. Mechanics, S.G.Venkatachalapathy, *Margham Publication, 2003.*

Practical paper 1: Mechanics

Work load: 30 hrs per semester

2 hrs/week

Minimum of 6 experiments to be done and recorded

1. Volume resonator
2. Viscosity of liquid by the flow method (Poiseuille's method)
3. Young's modulus material a rod by uniform bending
4. Young's modulus material a rod by non- uniform bending
5. Surface tension of a liquid by the method of drops
6. Surface tension of a liquid by capillary rise method
7. Determination of radius of capillary tube by Hg thread method
8. Viscosity of liquid by logarithmic decrement method
9. Bifilar suspension –moment of inertia.
10. Rigidity modulus of material of a wire-dynamic method (torsional pendulum)
11. Fly-wheel
12. Determination of Y of bar –cantilever.

**Paper II: Waves & Oscillations
(For Maths Combinations)
II SEMESTER**

Work load: 60 hrs per semester

4 hrs/week

UNIT I (12 hrs)

1. Simple Harmonic oscillations

Simple harmonic oscillator and solution of the differential equation-Physical characteristics of SHM, torsion pendulum-measurements of rigidity modulus, compound pendulum-

measurement of 'g', combination of two mutually perpendicular simple harmonic vibrations of same frequency and different frequencies. Lissajous figures.

UNIT II(12 hrs)

2. Damped and forced oscillations

Damped harmonic oscillator, solution of the differential equation of damped oscillator. Energy considerations, comparison with un-damped harmonic oscillator, logarithmic decrement, relaxation time, quality factor, differential equation of forced oscillator and its solution, amplitude resonance and velocity resonance.

UNIT III(10 hrs)

3. Complex vibrations

Fourier theorem and evaluation of the Fourier coefficients, analysis of periodic wave functions-square wave, triangular wave, saw tooth wave

UNIT IV(17hrs)

4. Vibrating strings : 8 hrs

Transverse wave propagation along a stretched string, general solution of wave equation and its significance, modes of vibration of stretched string clamped at ends, overtones and harmonics. Energy transport and transverse impedance.

5. Vibrations of bars: 9 hrs

Longitudinal vibrations in bars-wave equation and its general solution. Special cases i) bar fixed at both ends ii) bar fixed at the midpoint iii) bar free at both ends iv) bar fixed at one end. Tuning fork.

UNIT V(9 hrs)

6. Ultrasonics:9hrs

Ultrasonics, properties of ultrasonic waves, production of ultrasonics by piezoelectric and magnetostriction methods, detection of ultrasonics, determination of wavelength of ultrasonic waves.Applications of ultrasonic waves.

TEXT BOOKS

1. BSc Physics Vol.1, Telugu Academy, Hyderabad.

2. Waves and Oscillations. N. Subramanyam and Brijlal *Vikas Publishing House Private Limited.*
3. Unified Physics Vol., Mechanics, Waves and Oscillations, *Jai Prakash Nath & Co. Ltd. Meerut.*
4. Mechanics of Particles, Waves and Oscillations. Anwar Kamal, *New Age International.*

REFERENCE BOOKS:

1. Fundamentals of Physics. Halliday/Resnick/Walker, *Wiley India Edition 2007.*
2. Waves and Oscillations. S. Badami, V. Balasubramanian and K. Rama Reddy, *Orient Longman.*
3. College Physics-I. T. Bhimasankaram and G. Prasad. *Himalaya Publishing House.*
4. Science and Technology of Ultrasonics- Bladdevraj, *Narosa, New Delhi, 2004*
5. Introduction to Physics for Scientists and Engineers. F.J. Ruche. *McGraw Hill.*

Practical Paper 2: Waves & Oscillations

Work load: 30 hrs per semester

2 hrs/week

Minimum of 6 experiments to be done and recorded

1. Determination of 'g' by compound/bar pendulum
2. Simple pendulum normal distribution of errors-estimation of time period and the error of the mean by statistical analysis
3. Determination of the force constant by static and dynamic method and evaluation of 'g'.
4. Determination of the elastic constants of the material of a flat spiral spring.
5. Determination of moment of inertia of a cylindrical rod -bifilar suspension
6. Coupled oscillators
7. Verification of laws of vibrations of stretched string –sonometer
8. Determination of velocity of transverse wave along a stretched string-sonometer
9. Determination of frequency of a bar –Melde's experiment.
10. Study of a damped oscillation using the torsional pendulum immersed in liquid-decay constant and damping correction of the amplitude.
11. Searls viscometer
12. Lissajous figures-CRO

**Paper III: Wave Optics
(For Maths Combinations)
III SEMESTER**

Work load: 60 hrs per semester

4 hrs/week

UNIT I (7 hrs)

1. Aberrations:

Introduction – 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.

UNIT II (14 hrs)

2. Interference :

Principle of superposition-coherence-temporal coherence and spatial coherence-conditions for interference of light.

Fresnel's biprism-determination of wavelength of light. Determination of thickness of a transparent material using biprism –change of phase on reflection-Lloyd's single mirror experiment.

Oblique incidence of a plane wave on a thin film due to reflected and transmitted light (cosine law) –colors of thin films-Non reflecting films-interference by a plane parallel film illuminated by a point source- Interference by a film with two non-parallel reflecting surfaces (Wedge shaped film). Determination of diameter of wire, Newton's rings in reflected light. Determination of wavelength of monochromatic light, Michelson interferometer-types of fringes. Determination of wavelength of monochromatic light, Difference in wavelength of sodium D_1 , D_2 lines and thickness of a thin transparent plate.

UNIT III (12 hrs)

3. Diffraction:

Introduction, distinction between Fresnel and Fraunhofer diffraction, Fraunhofer diffraction –Diffraction due to single slit and circular aperture-Limit of resolution-Fraunhofer diffraction due to double slit-Fraunhofer diffraction pattern with N slits (diffraction grating). Resolving power of grating-Determination of wavelength of light in normal and oblique incidence methods using diffraction grating.

Fresnel's half period zones-area of the half period zones-zone plate-comparison of zone plate with convex lens-diffraction at a straight edge-difference between interference and diffraction.

UNIT IV(10 hrs)

4. Polarisation:

Polarized light: methods of polarization polarization by reflection, refraction, double refraction, scattering of light-Brewster's law-Mauls law-Nicol prism polarizer and analyzer-

Quarter wave plate, Half wave plate-optical activity, analysis of light by Laurent's half shade polarimeter-Babinet's compensator.

UNIT V (17 hrs)

5. Lasers and Holography: 10 hrs

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-Gabor hologram and its limitations, Applications of holography.

6. Fiber Optics: 7 hrs

Introduction- different types of fibers, rays and modes in an optical fiber, fiber material, principles of fiber communication (qualitative treatment only), advantages of fiber optic communication.

TEXT BOOKS:

1. BSc Physics, Vol.2, *Telugu Akademy, Hyderabad*
2. A Text Book of Optics-N Subramanyam, L Brijlal, *S.Chand & Co.*
3. Unified Physics Vol.II Optics & Thermodynamics – *Jai Prakash Nath & Co.Ltd., Meerut*
4. Second Year Physics, K. Ramakrishna,D.V.Brahmaji,A.Sreenivasa Rao & S.L.V. Mallikarjun, *VikasPublications,Guntur.*

REFERENCE BOOKS:

1. Optics,F..A. Jenkins and H.G. White, *Mc Graw-Hill*
2. Optics, AjoyGhatak,Tata Mc Graw-Hill.
3. Fundamentals of Physics. Halliday/Resnick/Walker.C. *Wiley India Edition 2007*
4. Introduction of Lasers – Avadhanulu, *S.Chand & Co.*
5. Fundamentals of Optics, H.R. Gulati and D.R. Khanna, 1991, R. Chand Publication
6. Principles of Optics- BK Mathur, *Gopala Printing Press, 1995*

Practical Paper III: Wave Optics

Work load:30 hrs

2 hrs/week

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. 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 fiber by wedge method
10. Spectrometer- i-d curve.
11. Determination of refractive index of liquid-Boy's method.
12. Determination of wavelength-Hartmann formula (prism)

**Paper IV: Thermodynamics & Radiation Physics
(For Maths Combinations)
IV SEMESTER**

Work load: 60 hrs per semester

4 hrs/week

UNIT I (11 hrs)

1. Kinetic theory of gases

Introduction –Deduction of Maxwell’s law of distribution of molecular speeds, experimental verification. Toothed wheel experiment. Transport phenomena-Viscosity of gases-thermal conductivity-diffusion of gases.

UNIT II(14 hrs)

2. Thermodynamics

Introduction- Isothermal and adiabatic process- Reversible and irreversible processes- Carnot’s engine and its efficiency-Carnot’s theorem-Second law of thermodynamics. Kelvin’s and Clausius statements-Thermodynamic scale of temperature-Entropy, physical significance –Change in entropy in reversible and irreversible processes-Entropy and disorder-Entropy of Universe-Temperature-Entropy (T-S) diagram-Change of entropy of a perfect gas- change of entropy when ice changes into steam.

UNIT III(11 hrs)

3. Thermodynamic potentials and Maxwell’s equations

Thermodynamic potentials-Derivation of Maxwell’s thermodynamic relations-Clausius-Clayperon’s equation-Derivation for ratio of specific heats-Derivation for difference of two specific heats for perfect gas.Joule Kelvin effect-expression for Joule Kelvin coefficient for perfect and Vanderwaal’s gas.

UNIT IV(10 hrs)

4. Low temperature Physics

Introduction-Joule Kelvin effect-liquefaction of gas using porous plug experiment Joule expansion-Distinction between adiabatic and Joule Thomson expansion-Expression for Joule Thomson cooling-Liquefaction of helium, Kapitza’s method-Adiabatic demagnetization, Production of low temperatures -applications of substances at low-temperature-effects of chloro and fluoro carbons on ozone layer.

UNIT V(14 hrs)

5. Quantum theory of radiation

Blackbody-Ferry’s black body-distribution of energy in the spectrum of black body-Wein’s displacement law,Wein’s law, Rayleigh-Jean’s law-Quantum theory of radiation-Planck’s law-Measurement of radiation-Types of pyrometers-Disappearing filament optical pyrometer-experimental determination-Angstrompyrheliometer-determination of solar constant, Temperature of Sun.

TEXT BOOKS:

1. BSc Physics, Vol.2, *Telugu Akademy, Hyderabad*
2. Thermodynamics, R.C. Srivastava, Subit K. Saha&Abhay K. Jain *Eastern Economy Edition.*
3. Unified Physics Vol.2, Optics & Thermodynamics, *Jai Prakash Nath&Co.Ltd., Meerut*
4. Second Year Physics, K. Ramakrishna,D.V.Brahmaji,A.Sreenivasa Rao & S.L.V. Mallikarjun, *VikasPublications,Guntur.*

REFERENCE BOOKS:

1. Fundamentals of Physics. Halliday/Resnick/Walker.C. *Wiley India Edition 2007*
2. Heat, Thermodynamics and Statistical Physics-N Brij Lal, P Subrahmanyam, PS Hemne, *S.Chand& Co.,2012*
3. Heat and Thermodynamics- MS Yadav, *Anmol Publications Pvt. Ltd, 2000*
4. University Physics, HD Young, MW Zemansky,FW Sears, *Narosa Publishers, New Delhi*
5. Text Book of +3 Physics – Samal, Mishra & Mohanty, National Library, Min.of Culture, Govt of India.
6. Modern Engineering Physics, A.S. Vasudeva, S.Chand& Co.,

Practical Paper IV: Thermodynamics**Work load: 30 hrs****2 hrs/week****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. Mechanical equivalent of heat
8. Thermoemf- thermo couple potentiometer
9. Coefficient of thermal conductivity of copper- Searle’s apparatus.
10. Thermal behavior of an electric bulb (filament/torch light bulb)
11. Measurement of Stefan’s constant- emissive method
12. Temperature variation of resistance- thermistor.

**Paper II: Waves & Oscillations
(For Non-Maths Combinations)
II SEMESTER**

Work load:60 hrs per semester

4 hrs/week

UNIT-I:(15 hrs)

1. Oscillatory Motion

Simple harmonic motion-Equation of motion and solution-Simple harmonic motion from the standpoint of energy-The rotor diagram representation of simple harmonic motion-Compound pendulum-determination of g and k , torsional pendulum-determination of n , Combination of Simple harmonic motions along a line and perpendicular to each other-Lissajous figures-

UNIT II:(14 hrs)

2. Damped Oscillators

Damped vibrations - Explanation and examples - Forced vibrations – Explanation and examples, Resonance, examples -Sharpness of resonance Q -factor, Volume Resonator, Determination of frequency of a given tuning fork.

UNIT-III:(11 hrs)

3. Wave Motion

Progressive waves-Equation of a progressive wave-sinusoidal waves-Velocity of waves in elastic media-Standing waves-Transverse vibrations of stretched strings, overtones and harmonics. Sonometer verification of laws of transverse vibrations in a stretched string, beats (qualitative analysis Only).

UNIT-IV:(10 hrs)

4.Acoustics

Classification of sound, Characteristics of musical sound, Acoustics of Buildings, Reverberation, Sabine's formula (without derivation) Absorption coefficient, Factors affecting acoustics of buildings, Intensity of sound, Sound distribution in an auditorium.

UNIT V:(10 hrs)

5. Ultrasonics

Ultrasonics, properties of ultrasonic waves, production of ultrasonics by piezoelectric and magnetostriction methods, detection of ultrasonics, Applications of ultrasonic waves.

TEXTBOOKS:

1. BSc Physics, Vol.1 -Telugu Academy, Hyderabad
2. Physics for Biology and Premedical Students –D.N. Burns & SGG Mac Donald
3. Unified Physics Vol.I Mechanics,Waves and Oscillations – *Jai Prakash Nath&Co.Ltd., Meerut.*
4. First year Physics, K.Ramakrishna, D.V.Brahmaji, A.Sreenivasa Rao and S.L.V.Mallikarjun, Vikas Publications, Guntur

REFERENCE BOOKS

1. Waves and Oscillations. S. Badami, V. Balasubramanian and K. Rama Reddy Orient Longman.
2. Waves and Oscillations. N. Subramaniam and BrijlalVikas Publishing House Private Limited.
3. Acoustics – Waves and Oscillations, S.N.Sen, Wiley Estern Ltd.

Practical Paper 2: Waves & Oscillations

Work load: 30 hrs per semester

2 hrs/week

Minimum of 6 experiments to be done and recorded

1. Determination of 'g' by compound/bar pendulum
2. Simple pendulum normal distribution of errors-estimation of time period and the error of the mean by statistical analysis
3. Determination of the force constant by static and dynamic method and evaluation of 'g'.
4. Determination of the elastic constants of the material of a flat spiral spring.
5. Determination of moment of inertia of a cylindrical rod -bifilar suspension
6. Coupled oscillators
7. Verification of laws of vibrations of stretched string –sonometer
8. Determination of velocity of transverse wave along a stretched string-sonometer
9. Determination of frequency of a bar –Melde's experiment.
10. Study of a damped oscillation using the torsional pendulum immersed in liquid-decay constant and damping correction of the amplitude.
11. Searls viscometer
12. Lissajous figures-CRO

Paper III: Optics
(For Non- Maths Combinations)
III SEMESTER

Work load: 60 hrs per semester

4 hrs/week

Unit – I: (10 hrs)

1. GEOMETRIC OPTICS

Aberrations in lenses-Chromatic Aberration-Achromatic Combination of lenses-Monochromatic defects-Spherical aberration-Astigmatism-Coma-Curvature and Distortion-Minimizing aberration.

UNIT II: (13 hrs)

2. INTERFERENCE

The superposition principle, Condition for Interference, Classification of Interferences methods-Young's double slit experiment-Theory. Interference with white light and appearance of Young's interference fringes-Intensity in interference pattern-Optical Path length, Lloyd's single mirror-Phase change on reflection, Interference due to plane parallel wedge shaped films, Colours in thin films-Newton rings, Determination of wavelength of light. Michelson's interferometer.

UNIT III :(12 hrs)

3. DIFFRACTION

The Fresnel and Fraunhofer diffraction phenomena-Fraunhofer diffraction of single Slit normal incidence and oblique incidence – Resolving power –limits of resolution for telescopes and microscope- Fraunhofer diffraction by double slit-Intensity-pattern-Diffraction grating- Wavelength determination (Normal incidence and Minimum deviation).

UNIT IV: (13hrs)

4. POLARIZATION

Types of Polarized light-Polarization by reflection, Brewster's law-Dichroism the Polaroid-double refraction- the calcite crystal-the principal plane-O and E rays-the Nicol Prism, Polariser and Analyser, Law of Malus –the quarter wave plate and halfwave plate Plane, Circularly, elliptically polarized light-Production and analysis -Optical activity-Specific rotatory power –Polarimeter.

UNIT V: (12 hrs)

5. Holography & Fiber Optics

Holography: Basic principle of holography-Gabor hologram and its limitations, applications of holography. Introduction- different types of fibres, rays and modes in an optical fibre, fibre material, principles of fiber communication (qualitative treatment only), applications.

TEXT BOOKS

1. BSc Physics, Vol.2, Telugu Academy, Hyderabad
2. Physics for Biology and Premedical Students –D.N. Burns & SGG Mac Donald
3. Unified Physics Vol.II Optics and Thermodynamics, *Jai Prakash Nath & Co. Ltd., Meerut.*
4. Second year Physics, K.Ramakrishna, D.V.Brahmaji, A.Sreenivasa Rao and S.L.V.Mallikarjun, Vikas Publications, Guntur

REFERENCE BOOKS

1. A Text Book of Optics-N Subramanyam, L Brijlal, *S.Chand & Co.*
2. Fundamentals of Optics, H.R. Gulati and D.R. Khanna, 1991, R. Chand Publication

Practical Paper III: Wave Optics

Work load: 30 hrs

2 hrs/week

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. 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 fiber by wedge method
10. Spectrometer- i-d curve.
11. Determination of refractive index of liquid-Boy's method.

Determination of wavelength-Hartmann formula (prism)

Paper IV: Thermodynamics & Radiation Physics
(For Non- Mathematics Combinations)
IV SEMESTER

Work load:60 hrs per semester

4 hrs/week

UNIT I: (12 hrs)

1. Kinetic theory of Gases

Zeroth law of thermodynamics, Measurement of temperature- resistance thermometry, thermoelectric thermometers-kinetic theory of gases- assumptions-pressure of an ideal gas-molecular interpretation of temperature- Maxwell's law of distribution of molecular speeds (no derivation)-experimental verification.

UNIT II: (12 hrs)

2. Thermodynamics

The first law of thermodynamics- work done in isothermal and adiabatic changes -Reversible and irreversible process-Carnot's cycle-Carnot's theorem - Second law of thermodynamics, Kelvin's and Clausius statements-Thermodynamics scale of temperature-Entropy, physical significance-Change in entropy in reversible and irreversible processes-Entropy and disorder-Entropy of universe.

UNIT III: (12 hrs)

3. Low temperature Physics

Introduction-Joule Kelvin effect-porous plug experiment. Joule's expansion-Distinction between adiabatic and Joule Thomson expansion-Liquefaction of helium Kapitza's method-Adiabatic demagnetization-Production of low temperatures-Principle of refrigeration. applications of substances at low-temperature.

UNIT IV: (12 hrs)

4. Measurement, laws and theories of radiation

Black body-Ferry's black body-distribution of energy in the spectrum of Black body- Wein's law- Planck's radiation formula (no derivation)-Measurement of radiation-Types of pyrometers-Disappearing filament optical pyrometer-experimental determination-Angstrom Pyroheliometer-determination of solar constant, effective temperature of sun.

UNIT V: (12 hrs)

5. Thermo-electricity

Seebeck effect variation of thermo – emf with temperature. Thermo electric series - Measurement of thermoemf using potentiometer, Law of intermediate metals and intermediate temperatures - Peltier effect, Demonstration Peltier coefficient. Thomson effect demonstration Thomson coefficient, Thermoelectric diagrams and their uses, Thermoelectric power. Application of Thermoelectric effects.

TEXT BOOKS

1. BSc Physics, Vol.2, Telugu Academy, Hyderabad
2. Physics for Biology and Premedical Students –D.N. Burns & SGG Mac Donald
3. Unified Physics Vol.II Optics and Thermodynamics, *Jai Prakash Nath & Co. Ltd., Meerut.*
4. Second year Physics, K.Ramakrishna, D.V.Brahmaji, A.Sreenivasa Rao and S.L.V.Mallikarjun, Vikas Publications, Guntur

REFERENCE BOOKS

1. Heat and Thermodynamics, N.Subramanyam and L.Brijlal, S.Chand & Co.
2. Electricity and Magnetism, N.Subramanyam and L.Brijlal, S.Chand & Co.
3. B.Sc Physics Vol.2, Sastry Sankar Rao and S. Babu Rao, S.Chand & Co.

NOTE: Problems should be solved at the end of every chapter of all units.

Practical Paper IV: Thermodynamics

Work load: 30 hrs

2 hrs/week

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. Mechanical equivalent of heat
8. Thermoemf- thermo couple potentiometer
9. Coefficient of thermal conductivity of copper- Searle’s apparatus.
10. Thermal behavior of an electric bulb (filament/torch light bulb)
11. Measurement of Stefan’s constant- emissive method

Temperature variation of resistance- thermistor