

Andhra Pradesh State Council of Higher Education
B.Sc. PHYSICS
STRUCTURE UNDER CHOICE BASED CREDITS SYSTEM
REVIEWED SYLLABUS w.e.f. 2015-16

First Semester

Paper I: Mechanics & Properties of Matter
Practical I (Lab-1)

Second Semester

Paper II: Waves & Oscillations
Practical 2 (Lab2)

Third Semester

Paper III: Optics & Laser Physics
Practical 3. (Lab 3)

Fourth Semester

Paper IV: Thermodynamics & Radiation Physics
Practical 4. (Lab 4)

Fifth Semester

Paper V: Electricity, Magnetism & Electronics
Paper VI: Modern Physics
Practical 5.(Lab 5)
Practical 6.(Lab 6)

Sixth Semester

Paper VII: Elective
Paper VIII: Elective (Clusters)
Practical 7(Lab 7)
Practical 8. (Lab 8)

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 Semester Exam (internal). 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 laboratory (practical) work.
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

Practicals	50 marks
Formula & Explanation	6
Tabular form +graph +circuit diagram	6
Observations	12
Calculation, graph, precautions & Result	6
Viva-Voce	10
Record	10

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

B.Sc. (Physics) (Mathematics 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: Optics & Laser Physics	4	3	75
4	Fourth	Paper IV: Thermodynamics & Radiation Physics	4	3	75
5	Fifth	Paper V: Electricity, Magnetism & Electronics Paper VI: Modern Physics	3 3	3 3	75 75
6	Sixth	Paper VII : Elective Paper VIII: Elective (Clusters)	3 3	3 3	75 75
Practicals					
1	First	Practical 1	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 (multiples)	2	3	50

*Third year syllabi will be sent shortly

**Student Activities like Seminars, Assignments, Fieldwork, Study Projects, Models etc. are Part of Curriculum for all units in all papers.

Andhra Pradesh State Council of Higher Education

(For Mathematics Combinations)

III SEMESTER

Work load:60 hrs per semester

4 hrs/week

UNIT-I (8hrs)

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 (14hrs)

2. Interference

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

UNIT-III (14hrs)

3. Diffraction

Introduction, distinction between Fresnel and Fraunhofer diffraction, Fraunhofer diffraction –Diffraction due to single slit-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 incidence and minimum deviation methods using diffraction grating, Fresnel's half period zones-area of the half

period zones-zone plate-comparison of zone plate with convex lens-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, determination of specific rotation by Laurent's half shade polarimeter-Babinet's compensator - idea of elliptical and circular polarization

UNIT-V (14hrs)

5. Lasers and Holography

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

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

REFERENCE 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. Optics, F..A. Jenkins and H.G. White, Mc Graw-Hill
5. Optics, Ajoy Ghatak, Tata Mc Graw-Hill.
6. Introduction of Lasers – Avadhanulu, S.Chand& Co.
7. Principles of Optics- B.K Mathur, Gopala Printing Press, 1995

Practical Paper III: Optics & Laser Physics

Work load:30hrs

2hrs/week

Minimum of 6 experiments to be done and recorded

1. Determination of refractive index of liquid-Boy's method.
2. Refractive index of a liquid-hallow prism
3. Dispersive power of a prism.
4. Determination of thickness of a thin wire by wedge method
5. Determination of radius of curvature of a given convex lens-Newton's rings.
6. Determination of wavelength of light using diffraction grating-minimum deviation method.
7. Determination of wavelength of light using diffraction grating-normal incidence method.
8. Resolving power of grating.
9. Resolving power of a telescope.
10. Study of optical rotation –Polarimeter.
11. Determination of wavelength of Laser light using diffraction grating

Suggested student activities

Student seminars, group discussions, assignments, field trips, study project and experimentation using virtual lab

Examples

Seminars :- A topic from any of the Units is given to the student and asked to give a brief seminar presentation.

Group discussion :- A topic from one of the units is given to a group of students and asked to discuss and debate on it.

Assignment :- Few problems may be given to the students from the different units and asked them to solve.

Field trip :- Visit to Satish Dhawan Space Centre, Sriharikota / Thermal and hydroelectric power stations / Science Centres, any other such visit etc.

Study project :- Web based study of different satellites and applications.

Domain skills:

Logical derivation, experimentation, problem solving, data collection and analysis, measurement skills

***** Documental evidence is to be maintained for the above activities.**

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

IV SEMESTER

Work load: 60hrs per semester

4 hrs/week

UNIT-I (10hrs)

1. Kinetic theory of gases

Introduction –Deduction of Maxwell’s law of distribution of molecular speeds, experimental verification. Transport phenomena – Mean free path - Viscosity of gases-thermal conductivity-diffusion of gases.

UNIT-II(12hrs)

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-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 of a perfect gas- change of entropy when ice changes into steam.

UNIT-III(12hrs)

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 vander Waal’s gas.

UNIT-IV(12hrs)

4. Low temperature Physics

Introduction-Joule Kelvin effect-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 – Angstrom pyroheliometer-determination of solar constant, Temperature of Sun.

REFERENCE BOOKS:

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

Practical Paper IV: Thermodynamics & Radiation Physics

Work load: 30hrs

2hrs/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 good conductor-Searle's method
3. Thermal conductivity of bad conductor-Lee's method
4. Thermal conductivity of rubber.
5. Specific heat of a liquid by applying Newton's law of cooling correction.
6. Heating efficiency of electrical kettle with varying voltages.
7. Thermo emf- thermo couple
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.

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Study project :- Web based study of different satellites and applications.

Domain skills:

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State Council of Higher Education

B.Sc. Physics (Non-Mathematics Combinations)**Scheme of Syllabus 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
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4	Fourth	Paper IV: Thermodynamics & Radiation Physics	4	3	75
5	Fifth	Paper V: Electricity, Magnetism & electronics	3	3	75
		Paper VI: Modern Physics & Medical Physics	3	3	75
6	Sixth	Paper VII : Elective	3	3	75
		Paper VIII: Elective (Clusters)	3	3	75
Practical					
1	First	Practical 1	2	3	50
2	Second	Practical II	2	3	50
3	Third	Practical III	2	3	50
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Andhra Pradesh State Council of Higher Education

BSC PHYSICS SYLLABUS UNDER CHOICE BASED CREDIT SYSTEM

**Paper III: Optics & Laser Physics
(For Non- Mathematics 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 half wave plate Plane, Circularly, elliptically polarized light-Production and analysis -Optical activity-Specific rotatory power -Polarimeter.

UNIT V: (12 hrs)

5. Lasers and Holography

Lasers: introduction, spontaneous emission, stimulated emission. Population Inversion, Laser principle- 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

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

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4. Optics, AjoyGhatak, Tata Mc Graw-Hill.
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Practical Paper III: Optics & Laser Physics

Work load: 30 hrs

2 hrs/week

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

Work load: 60hrs per semester

4 hrs/week

UNIT-I (12hrs)

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 (12hrs)

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 -Entropy, physical significance-Change in entropy in reversible and irreversible processes-Entropy and disorder-Entropy of universe.

UNIT-III (12hrs)

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 (12hrs)

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 (12hrs)

5. Thermoelectricity

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

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Practical Paper IV: Thermodynamics & Radiation Physics

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