ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION
(A Statutory body of the Government of Andhra Pradesh)

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REVISED SYLLABUS OF B.Sc. PHYSICS
(FOR MATHEMATICS COMBINATIONS)
UNDER CBCS FRAMEWORK WITH EFFECT FROM 2020-2021

PROGRAMME: FOUR-YEAR UG HONOURS PROGRAMME

Physics for Mathematics Combinations

(With Learning Outcomes, Unit-wise Syllabus, References, Co-curricular Activities &

Model Q.P.)

For Fifteen Courses of 1, 2, 3 & 4 Semesters)

(To be Implemented from 2020-21 Academic Year)

AP STATE COUNCIL OF HIGHER EDUCATION
B.Sc. PHYSICSSYLLABUS UNDER CBCS
[For Mathematics combinations]
w.e.f. 2020-21 (Revised in May 2020)

First Semester
Course I: Mechanics, Waves and Oscillations
Practical Course I (Lab-1)

Second Semester
Course II: Wave Optics
Practical Course II (Lab-2)

Third Semester
Course III: Heat and Thermodynamics
Practical Course III (Lab-3)

Fourth Semester
Course IV: Electricity, Magnetism and Electronics
Practical Course IV (Lab- 4)

Course V:Modern Physics
Practical Course V (Lab-V)

B.Sc. PHYSICS COURSE STRUCTURE UNDER CBCS

Year	Semester	Course	Title of the Course	Marks	No.ofHrs /Week	No.of Credits
I	I	I	Mechanics, Waves and Oscillations	100	4	03
			Practical Course- I	50	2	02
	II	II	Wave Optics	100	4	03
			Practical Course – II	50	2	02
II	III	III	Heat and Thermodynamics	100	4	03
			Practical Course – III	50	2	02
	IV	IV	Electricity, Magnetism and Electronics	100	4	03
			Practical Course – IV	50	2	02
		V	Modern Physics	100	4	03
			Practical Course –V	50	2	02
Total No. of Courses : **05 (Five)**						

B.Sc. PHYSICS SYLLABUS UNDER CBCS
For Mathematics Combinations
[2020-21 Batch onwards]
I Year B.Sc.-Physics: II Semester
Course-II: WAVE OPTICS

Work load:60 hrs per semester   **4 hrs/week**

Course outcomes:

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

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

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

UNIT-III Polarisation of light:(12hrs)

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

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

Monochromatic aberrations, Spherical aberration, Methods of minimizing spherical aberration, Coma, Astigmatism and Curvature of field, Distortion; Chromatic aberration-the achromatic doublet; Achromatism for two lenses (i) in contact and (ii) separated by a distance.

Fibre optics: Introduction to Fibers, different types of fibers, rays and modes in an optical fiber, Principles of fiber communication (qualitative treatment only), Advantages of fiber optic communication.

UNIT-V Lasers and Holography:(12hrs)

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

REFERENCE BOOKS:
- BSc Physics, Vol.2, Telugu Akademy, Hyderabad
- A Text Book of Optics-N Subramanyam, L Brijlal, S.Chand& Co.
- Optics-Murugeshan, 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

Practical Course II: Wave Optics

Work load: 30hrs   **2 hrs/week**

Course outcomes (Practicals):

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

1. *Gain hands-on experience of using various optical instruments like spectrometer, polarimeter and making finer measurements of wavelength of light using Newton Rings experiment, diffraction grating etc.*

2. *Understand the principle of working of polarimeter and the measurement of specific rotatory power of sugar solution*

3. *Know the techniques involved in measuring the resolving power of telescope and dispersive power of the material of the prism.*

4. *Be familiar with the determination of refractive index of liquid by Boy's method and the determination of thickness of a thin wire by wedge method.*

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.

RECOMMENDED CO-CURRICULAR ACTIVITIES:

MEASURABLE

❖ Assignments (in writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging)

- ❖ Student seminars (on topics of the syllabus and related aspects (individual activity)
- ❖ Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams)
- ❖ Study projects (by very small groups of students on selected local real-time problems pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured (team activity)

GENERAL

- ❖ Group Discussion
- ❖ Visit to Research Stations/laboratories and related industries

RECOMMENDED ASSESSMENT METHODS

Some of the following suggested assessment methodologies could be adopted;

- ❖ The oral and written examinations (Scheduled and surprise tests),
- ❖ Practical assignments and laboratory reports,
- ❖ Efficient delivery using seminar presentations,
- ❖ Viva voce interviews.

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