ADIKAVI NANNAYA UNIVERSITY
RAJAMAHENDRAVARAM
CBCS / Semester System
(W.e.f. 2015-16 Admitted Batch)
III Semester Syllabus
PHYSICS
(For Mathematics Combinations)
WAVE OPTICS

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

UNIT-I   **(8 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   **(14hrs)**
2. Interference
Principle of superposition – coherence-temporal coherence and spatial coherence-conditions for interference of light. Fresnel's biprism-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 Fraunhoffer diffraction, Fraunhoffer diffraction –Diffraction due to single slit- Fraunhoffer diffraction due to double slit- Fraunhoffer 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, rays and 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, AjoyGhatak,Tata Mc Graw-Hill.
   6. Introduction of Lasers – Avadhanulu, S.Chand& Co.
   7. Principles of Optics- BK Mathur, Gopala Printing Press, 1995

<center>Practical Paper III: Wave Optics</center>

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. 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.

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.

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 as30 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