

NMKRV COLLEGE FOR WOMEN
AUTONOMOUS INSTITUTION
JAYANAGAR, BANGALORE 11

DEPARTMENT OF PHYSICS
VI SEMESTER SYLLABUS COMPLETED

PAPER: PHY 6.3

Astro Physics, Nuclear Physics and Material Science

Problems to be worked out in all units

Unit I

Astrophysics

Parallax and distance: Heilo-centric parallax, Definition of parsec (pc), Astronomical unit (AU), light year(ly) and their relations.

Luminosity of stars: Apparent brightness, Apparent magnitude-scale of Hipparchus. Absolute magnitude - distance-modulus relationship. Distinction between visual and bolometric magnitudes, Radius of a star.

Stellar classification: Pickering classification and Yerke's luminosity classification. H-R diagram, Main sequence stars and their general characteristics.

Gravitational potential energy or self energy of a star based on the linear density model, Statement and explanation of Virial theorem.

Surface or effective temperature and colour of a star; Application of laws of Black body Radiation to stellar temperature and Luminosity Wien's displacement law. Photon diffusion time (qualitative), Mass-luminosity relationship and expression for life time of a star.

Unit II

Nuclear Physics

Alpha particle scattering: Rutherford's theory of alpha particle scattering (assuming the path to be hyperbolic)

Alpha decay: Disintegration energy and Range of alpha particle, Gieger-Nuttal law. Brief description of the characteristics of alpha ray spectrum, Gamow's theory of alpha decay.

Beta decay: Types of beta decay (electron, positron and electron capture) Characteristics of beta ray spectrum and Pauli's neutrino hypothesis.

Unit III

Material Science

Nanomaterials-Synthesis techniques (Top down and bottom up) - Electron confinement - Size effect - Surface to volume ratio, distinction between nanomaterials and bulk materials in terms of energy band. Distinct properties of nanomaterials. Classification of Nanosystems-quantum dots, nanowires and nano films. Multilayered materials - Graphene, Fullerene, Carbon Nano Tube (CNT), Mention of application of nanomaterials.

Dielectrics: Static dielectric constant, polarizability (electronic, ionic and orientation), calculation of Lorentz field (derivation)

VI Semester Physics Practicals (PHY 6.4)
(Portions completed 100%)

1. Analysis of stellar spectra
2. Characteristics of G M Counter
3. Verification of Inverse square law
4. Sun spots
5. Mass absorption coefficient
6. Parallax method
7. Dielectric constant
8. HR - diagram