CURRICULUM DEVELOPMENT PLAN: Prof. Punita Verma

B.Sc. (H) Physical Sciences Vth Semester (Odd Semester, 2024-2025) Paper: RADIATION PHYSICS AND APPLICATIONS; UPC: 32227504; Credit: 04 (Lecture-02, Practical-02)

DISCIPLINE SPECIFIC ELECTIVE COURSE – Contents Unit – I (8 Hours) a) Radiation and its interaction with matter: Basic ideas of different type of radiation electromagnetic (X-ray, gamma	Allocation of Lectures 2 lectures	Month wise schedule followed by the teacher a) July	Test/ Assignment/ Presentation etc. • An Overview of the entire syllabus will be given.
rays, cosmic rays etc.), nuclear radiation and their origin (stable and unstable isotopes), half life and mean life.b) Nuclear Radiation: Basic idea of	b) 6 lectures	b) Aug	• Each topic will be explained
alpha, beta, gamma and neutron radiation and their sources (sealed and unsealed sources). Kinematics of nuclear reactions, Q value			with the help of ppts, videos and text from prescribed
Interaction of charged particles (including alpha particles): Heavy charged particles (e.g. accelerated ions) - Beth- Bloch formula, scaling laws, mass stopping power, range, straggling. Cherenkov radiation			reference Books. • Assignment will be given after completion of
Interaction of beta particles: Collision and Radiation loss (Bremsstrahlung).			each topic.Assig
Interaction of photons: Linear and Mass Attenuation Coefficients. Interaction of Neutrons: Collision, slowing down and Moderation.			nment register will be checked after each unit's completion.
Unit - II (8 Hours) a) Radiation Units, dosage and safety management: Radiation Quantities and Units: Biological effects of ionizing	a) 2 lectures	a) Aug	Test 1 Discussion on previous

 radiation, Interaction of ionising and non- ionising radiation at the cellular level. b) Basic idea of different units of activity, KERMA, exposure, absorbed dose, equivalent dose, effective dose, collective equivalent dose, quality factor, radiation and tissue weighting factors, annual limit of intake (ALI) and derived air concentration (DAC). 	b) 3 lectures	a) Sept	Year's Question Papers • Discussion on Student's difficulties
c) Radiation safety management: Operational limits and basics of radiation hazards, its evaluation and control: radiation protection standards. Concept of ALARA Principle using Distance, time and shielding.	c) 3 lectures	c) Sept	
Unit - III (8 Hours)			
a) Radiation detection and monitoring devices: Basic concepts and working principle of gas detectors, Scintillation Detectors, Solid State Detectors and Neutron Detectors,	a) 4 lectures	a) Sept	• Possible Problems of this units will be discussed.
b) Types of Radiation Dosimeters: thermoluminescence, radiographic films, calorimetry, semiconductor diodes;	b) 4 lectures	b) Oct	• Revision session prior to internal assessment
c) Relation between detection and dosimetry, Interaction of ionising and non-ionising radiation at the cellular level.	c) 2 lectures	c) Oct	examination.
Unit IV 6 hours	a) 2 lectures	a) Oct	• Test 2
 a) Application of radiation as a technique: Application in medical science (e.g., basic principles of X- rays, MRI, b) PET, CT scan, Projection Imaging Gamma Camera, Radiation therapy), 	b) 4 lectures	b) Nov	Discussion on previous Year's Question Papers
Archaeology, Art, Crime detection, Mining and oil. Industrial Uses: Tracing, Gauging, Material Modification, Sterilization, Food preservation.			• Revision session prior to final exam.