ZOS555- RADIATION BIOLOGY

Teaching Hours 10 /Unit

COURSE OUTCOME

1. This course is included to discuss the principles of radioactivity and different sources of radiation.
2. The biological effects of both ionizing and non-ionizing radiations are discussed. It gives basic training to students to understand the harmful effects of radiations and protect themselves from accidental exposure to radiation resources.
3. The functional principles of different instruments that are used for measuring environmental/biological radiation levels are discussed with students.
4. The studies also include awareness of various radiation disasters across the world.
5. Students are trained to use different instruments so that they can take up the subject for getting jobs in radiotherapy or radiation related works.
6. As the instruments used in the radiation application and measurements needs a special handling procedure, helps students get special skills in the radiation biology fields. These training build confidence and awareness in students to use different radiation resources and they can be entrepreneurs in this field.

UNIT I

Radiological Physics**:** Atomic structure models, Constituents of atomic nuclei, Isotope, Isobars, Radioactivity, laws of Radioactivity, High energy Electromagnetic radiation and its properties, Radiation units- Units of radioactivity,mode of interaction of X & gamma rays- Photoelectric, Compton effect & Pair production.

UNIT II

Radiation detection and Measurement:Principles of radiation detection and measurement, Basic principles, Design & Working of physical dosimeters- Ionization chamber, Proportional counters, GM- Counter, Concepts of Gas amplification, Resolving time & Dead time, Scintillation Detectors, Thermoluminiscent Dosimeter, Semiconductor, Lithium detectors, Area survey meter, Film badge. Chemical dosimeters- Salient Features of Chemical dosimeter, Fricke dosimeter, methyl orange, FBX dosimeter, Free radical dosimeter, Ceric sulphate dosimeter,chlorobenzene dosimeter, High & low dose indicators.

UNIT III

Radiochemistry & Radiobiology:Radiolysis of water, G-value, Direct and Indirect action, Interaction of radiation with living system – Viruses, Prokaryotic & Eukaryotic cells, Effect of radiation on Nucleic acids, Proteins, Enzymes & Carbohydrates, Cellular effects of radiation, Mitotic delay, Inhibition of mitosis, Giant cell formation, Cell death, Cell recovery &Modification of Radiation damage, Genetic Effect, Chromosomal breakage and Aberrations, Somatic effect of radiation.

UNIT IV

Radiation safety measures:Natural & Man-made radiation exposures, Maximum permissible dose (MPD), Evaluation of external &internal radiation hazards, Radiation protection measures in industrial establishment, Radioisotope labs, diagnostic & therapeutic installation & during transportation of radioactive substances, disposal of radioactive waste, administrative & legislative aspect of radiation protection.

UNIT V

Applications of Radioactivity:Radioisotopes in biology, Agriculture, Plant breeding, Soil plant relationship & plant physiology, Medicine, (Therapy & diagnosis), Radiation Hormosis, Radioimmunoassay, Radio tracer techniques with illustrative examples.

REFERENCES

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