



B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19
Autonomous Institute, Affiliated to VTU

INSTITUTIONAL ELECTIVE OFFERED BY THE DEPARTMENT OF PHYSICS

Radiation Hazard and Protection

Course Name	Radiation Hazard and Protection	Course Code	23PY7OERHP
Credits	03	L-T-P-S	3-0-0-0
Contact hours	36	Faculty Handling	Dr. Kaliprasad C S

L-Lecture, T-Tutorials, P- Practical, CIE-Continuous Internal Evaluation, SEE-Semester End Examination

Course objectives:

- To understand the essentials of radioactivity and radiation interaction.
- To understand the radiation hazard and safety standards
- To understand the radiation diagnostics and protection
- To understand the nuclear instrumentation
- To understand the Isotopes and its applications

Course outcomes: On completion of the course, the student will have the ability to:

C01	Understand and Apply the knowledge of radioactivity, radiation interaction, radiation dosimetry, radiation protection for engineering applications.
C02	Use appropriate Tools to develop the concept of radiation protection, perform as a member of team to build a model and make an oral presentation

Module 1. Radioactivity & Interaction of Radiation:

6 hours

Radioactivity - Discovery- Natural & Artificial Radioactivity- Isotopes and nuclides – binding forces between nuclear particles –alpha & beta particles – gamma radiation - mechanisms of radioactive decay – half life - Interaction of electrons, X-rays & γ -rays with matter - Radiation intensity & exposure - radiation dose - Radiation quality – law of exponential attenuation – half value layer – linear attenuation coefficient.

Module 2. Health Physics and Radiation- Protection 1

8 hours

Radiation Protection Instruments, Radiation dosimetry, Radiation protection in nuclear medicine, Radiation quantities and units, Radiation hazards- evaluation and control; basic principles and operational limits, Basic safety standards,



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Planning of nuclear medicine laboratories; radiation monitoring, decontamination procedures; radiation protection in diagnostic and therapeutic nuclear medicine-protection of the patient.

Module 3. Health Physics and Radiation-Protection 2 **8 hours**

Guidance level for diagnostic administration, misadministration and preventive measures. Protection of staff, public and environment, radiation surveillance procedures. Radioactive waste management; Transport of radioactive material: Radiation emergencies, Large-scale spillage, Regulatory aspects & licensing The Atomic Energy Act, Surveillance procedures issued under the Rules

Module 4. Nuclear instrumentation **8 hours**

Gamma Camera, SPECT, PET, detectors- gamma ray spectrometer, scintillation counters, Accelerators

Module 5. Isotopes and its applications **6 hours**

Industrial applications of radioisotopes and radiation - application of tracer technology to the environment

Reference Books:

1. Physics in Nuclear Medicine - Sorenson
2. Nuclear Medicine & PET CT Technology & Techniques Paul E Christian
Kristen M Waterstramrich
3. Radioactivity 2nd Edition Michael L Annuziata
4. Knoll G.F. - Radiation Detection and Measurement. John Wiley & Sons, 2010
- ISBN:9780470649725
5. Faure G. and Mensing T.M - Isotopes-Principles and Applications. John Wiley
& Sons, 2004 - ISBN:9780471384373



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COs and POs Mapping

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3											
CO2					3				2	2		

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0-Not Mapped

Scheme of Evaluation:

Component	Type of assessment	Max. Marks	Weightage	Total	Total Marks	
CIE - Theory	AAT 1	10	10	50*	50 (CIE)	
	AAT 2	10				
	Test 1	40	Best of Two tests			40
	Test 2	40				
	Test 3	40				
SEE	End Exam	100	50		50 (SEE)	
Grand Total Marks					100	
* Minimum CIE marks (Theory) ≥ 10.0 to be eligible to write the SEE						