Course Code:	24PH203	Course Title:	MEDICAL PHYSICS
Credits:	3	L – T – P	3-0-0

Course objectives:

To impart knowledge on the

* To explore the principle, effects and clinical applications of ionizing radiation.
* To study the application of radio isotopes medicine.
* To accentuate the effect of sound in human body.
* To study the various dosimetry quantities and their effects.
* To accentuate the behavior of materials used in medicine.

UNIT I EFFECT OF IONIZING RADIATION	**[9 hours]**

Production, properties and classification of electromagnetic radiation- Different sources of radiation - Photoelectric effect- Compton Scattering-Coherent scattering- Infrared radiation and its biological applications-UV radiation and its applications- damaging effects of UV light - Radiometry and photometry- Electrical impedance and Biological Impedance--Artificial Intelligence in Radiotherapy.

UNIT II NUCLEAR RADIATION AND ITS EFFECTS ON THE BODY	**[9 hours]**

Radionuclides used in medicine and biology-LD50-Cause of radiation death- Radiation Carcinogenesis-Cataract Genetic Effects-Permissible exposures- Maximum permissible occupational doses- Protective measures- Applications of Artificial intelligence in Nuclear Medicine

UNIT III ULTRA SOUND IN MEDICINE	**[9 hours]**

Production-properties and propagation of ultrasonic waves-Bioacoustics-Acoustical characteristics of human body-Ultrasonic Dosimetry-Destructive and nondestructive tests-Cavitation-Piezo electric receivers, thermoelectric probe-Lithotrophy-High power ultrasound in therapy-Artificial intelligence in Medical Ultrasound.

UNIT IV MICRO DOSIMETRY & NANODOSIMETRY	[9 hours]

Microdosimetry : Microdosimetric quantities- solid state based microdosimetric techniquesgas based microdosimetry- Biological effects of microdosimetry- evaluation of Monte Carlo techniques for microdosimetry, microdosimetry in targeted radionuclide therapy and radiotherapy.

Nanodosimetry and its Applications : Definition- Nanodosimetric quantities- charge counting Nanodosimetry- electron based nanodosimetry and ion based nanodosimetry-Radiation detector- Radiation protection- Radiation biology- Radiation protection- Gamma spectrometry-Gas sensor Oncology.

UNIT V MATERIALS USED IN MEDICINE	[9 hours]

Materials for ophthalmology – contact lens and intraocular lens materials – Corneal Implants-Implants for Glaucoma,-Implants for Retinal Detachment surgery – Bio Materials for bone and joint replacement –dental metals and alloys – ceramic – Bio materials :bioinert – bioactive ceramics – polymers - Artificial organs – cardiovascular materials – cardiac prosthesis - vascular graft materials – cardiac pacemakers – cardiac assist devices – Artificial organs –Dialysis-Heamo filtration

Course outcomes:

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

CO No	Corse Outcomes	Level
CO1	Explain the properties of Electromagnetic Radiation and their effects.	K2
CO2	Understand the use of radionuclides in medicine, cause of radiation, maximum permissible occupational doses protective measures.	K2
CO3	Demonstrate the knowledge on the properties of sound and its application in medicine.	K2
CO4	Explain the biological effects of dosimetry's.	K2
CO5	Understand the use of materials in medicine.	K2

TEXT BOOKS:

1. B.H. Brown, R.H. Smallwood, D.C. Barber, P.V. Lawford, D.R. Hose, ―Medical Physics and Biomedical Engineering‖, Institute of physics publishing, Bristol and Philadelphia, 1999.
2. Abu-Faraj, Ziad O., Handbook of Research on Biomedical Engineering Education and Advance Bioengineering Learning, 2012,Volume 1, IGI Global, Hershey, USA.

REFERENCES:

1. W.J. Meredith and J.B. Massey "Fundamental Physics of Radiology" Varghese Publishing house, Third Edition, 2013.
2. Steve Webb, The Physics of Medical Imaging, Taylor & Francis, Newyork, Second Edition, 2012.