Question Paper

Exam Date & Time: 01-Sep-2022 (10:00 AM - 01:00 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

SECOND SEMESTER M.Sc. MRP DEGREE EXAMINATION - SEPTEMBER 2022
SUBJECT: MRP5201 - RADIATION PHYSICS, RADIATION QUANTITIES AND UNITS
(2021 SCHEME)

Marks: 100 **Duration: 180 mins.**

Answer all the questions.

Answer the following questions:

1)	Discuss the various modes of decay of an atom.	(20)
2A)	Explain the production of radionuclide in a nuclear reactor. Give the characteristics of the produced radionuclide.	(10)
2B)	Give the postulates of Bohr's atom model. Obtain an expression for the radius and energy of the n^{th} orbit.	(10)
3A)	What is Compton Effect? State its importance in radiology.	(10)
3B)	Discuss in detail dosimetric quantities.	(10)
3C)	Write short note on collisional losses and radiative losses.	(10)
3D)	Discuss in detail the protection quantities.	(10)
4A)	Write a short note on Relative Biological effectiveness.	(5)
4B)	Write a short note on Bragg peak.	(5)
4C)	Determine the modified wavelength of x – rays whose $\lambda = 0.7080$ °A. Which were scattered from a carbon block through an angle of 90°.	(5)
4D)	Define Half Value Thickness and Tenth Value Thickness. Derive the relationship between them.	(5)

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Question Paper

Exam Date & Time: 02-Sep-2022 (10:00 AM - 01:00 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

SECOND SEMESTER M.Sc. (MEDICAL RADIATION PHYSICS) DEGREE EXAMINATION - SEPTEMBER 2022
SUBJECT: MRP5204 - RADIOBIOLOGY AND RADIOBIOLOGICAL BASIS OF RADIOTHERAPY
(2021 SCHEME)

Marks: 100 **Duration: 180 mins.**

Answer all the questions.

1)	Describe the various acute radiation syndromes following whole body exposure to large doses	(20)
2)	Explain the importance of dose rate effect and oxygen effect in modifying the radiation response	(20)
3A)	Discuss the relationship between relative biological effectiveness(RBE) and LET of radiation	(10)
3B)	Explain the multi target-single hit theory of cell survival	(10)
3C)	With the help of BED equation show that smaller dose fractions reduce the late normal tissue toxicity.	(10)
3D)	Describe the linear quadratic model of cell survival with a neat diagram and explain the mechanistic bases supporting this model	(10)
4A)	Describe the use of permanent implants in brachytherapy	(5)
4B)	Describe the process of DNA replication	(5)
4C)	Discuss the role of radiation sickness in assessing the seriousness of radiation exposure	(5)
4D)	Why are bone marrow cells more sensitive than muscle cells?	(5)

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