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K19P 1123

Reg. No. :

Name :

III Semester M.Sc. Degree (CBSS-Reg./Sup./Imp.)**Examination, October - 2019****(2014 Admission Onwards)****PHYSICS****PHY3E02 - RADIATION PHYSICS**

Time : 3 Hours

Max. Marks : 60

SECTION-AAnswer both questions either **a** or **b**. **(2x12=24)**

- I. a) Describe the principle, construction and working of a cyclotron. In a cyclotron which gives a proton beam the strength of magnetic field is 1.5 Tesla and the extreme radius is 0.15m. Calculate the energy of the emergent proton in electron volts. ($e=1.6 \times 10^{-19} \text{C}$, $m=1.7 \times 10^{-27} \text{kg}$).

(OR)

- b) What is Compton scattering? Derive the relation for change in wavelength of Photons due to Compton scattering.
- II. a) Explain the general characteristics of radiation detectors. Discuss the properties of diagnostic radiology detectors.

(OR)

- b) What is mutation? Give the classification of mutations. Explain gene mutations.

SECTION-BAnswer any **Four** questions- 1 mark for part a, 3 marks for part b and 5 marks for part c. **(4x9=36)**

- III. a) Give two sources of electromagnetic radiation.
- b) Explain annihilation radiation.
- c) Discuss Bremsstrahlung process and draw the Bremsstrahlung energy spectrum.

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- IV. a) Distinguish between elastic scattering and inelastic scattering.
b) Calculate the minimum energy in eV of gamma rays necessary to disintegrate a deuteron into a proton and neutron.
mass of proton=1.00759amu
mass of neutron=1.00898amu
mass of Deuteron=2.01471amu
 $1\text{amu}=1.66\times 10^{-27}\text{kg}$
c) Explain and give the applications of Artificial Radioactivity.
- V. a) What is a nuclear reactor?
b) Distinguish between fast neutrons,slow neutrons and thermal neutrons.
c) Explain the role of a moderator in a nuclear reactor with an example.
- VI. a) Define Kerma.
b) Explain the components of Kerma.
c) Discuss the differences between Kerma and absorbed dose.
- VII. a) What is shielding?
b) Explain how alpha and beta radiation is shielded.
c) Define linear and mass attenuation coefficient.How is X and gamma radiation shielded?
- VIII. a) What are free radicals?
b) How do free radicals damage the body?
c) Explain the role of antioxidants on free radicals.
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