

Q1.(a) Explain why the effective half-life of a radionuclide in a biological system is always less than the physical half-life.

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(2)

(b) The physical half-life of a radionuclide is 20 days. The nuclide was administered to a patient. Initially the corrected count rate at the patient's body was $2700 \text{ counts s}^{-1}$. Five days later, the corrected count rate at the same place on the patient was $1200 \text{ counts s}^{-1}$.

Calculate the biological half-life of the nuclide.

biological half-life = _____ days

(4)

(c) The table below gives the properties of two radionuclides.

	Technetium 99 m	Iodine 131
emitted radiation	gamma	beta ⁻ and gamma
half-life / hours	6.0	190
energy of gamma ray / keV	140	610

By considering information in the table suggest which of these nuclides is more suitable for use as a tracer in medical diagnosis.

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(4)
(Total 10 marks)