THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[AHS 0423]   APRIL 2023   Sub. Code: 2103

B.Sc. NUCLEAR MEDICINE TECHNOLOGY
FIRST YEAR (Regulations 2010-2011 & 2018-2019 onwards)
PAPER III – BASIC PHYSICS & NUCLEAR PHYSICS
Q. P. Code: 802103

Time: Three hours   Maximum : 100 Marks

Answer ALL Questions

I. Elaborate on: (3 x 10 = 30)

1. Write in detail about types of interaction of electromagnetic radiation with matter, explain them with suitable equation, diagrams and examples.

2. Describe the different processes of radiation decay. Compare the properties of alpha, beta and gamma rays.

3. Explain atomic structure and its models.

II. Write notes on: (8 x 5 = 40)

1. Relation between HVT and TVT. Write the HVT of any three radionuclide used in Nuclear Medicine.
2. Capacitance.
3. How is Bremsstrahlung produced? Does its production increase or decrease with increasing kinetic energy of the electron and atomic number of the absorber?
4. Ammeter and Multimeter.
5. What is the relation between absorbed does and equivalent dose? Also write the unit of absorbed dose and equivalent dose.
6. If 5.0×10^{18} atoms decay with a half-life of 2.3 years, how many are remaining after 4.7 years?
7. Differentiate self and mutual induction.
8. What is Radioactivity? Derive the decay equation $A = A_0 e^{(-\lambda t)}$.

III. Short answers on: (10 x 3 = 30)

1. Explain law of exponential attenuation.
2. List three properties of electro magnetic radiation.
3. Periodic table.
4. Explain annihilation reaction.
5. Differentiate Kerma and Exposure.
6. The transformer losses.
7. If the exposure rate at 5 meters from a radioactive source is 15mR/hour, what will be the exposure rate be at 20 meters?
8. State Faraday's laws of electromagnetic induction.
9. Define physical half-life, biological and effective half-life.
10. Define conductor and insulator based on electrical conductivity. Give its examples.

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