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MPH 452

Second Semester M.Sc. Degree Examination, September/October 2022

MEDICAL PHYSICS

Radiation Dosimetry and Standardization

Time : 3 Hours

Max. Marks : 70

- Instructions :** 1) Number the answers **properly**.
2) Give illustrations **wherever** necessary.

PART – I

Answer **any five** of the following :

(5×4=20)

1. Define exposure and one Roentgen.
2. Define RBE and LET.
3. Define charge particle equilibrium and types.
4. Mention the sources of neutron in radiotherapy and classify various neutrons.
5. a) What is 4π counting ?
b) Write about extrapolation chamber.
6. Define free radicals and G-value.

PART – II

Answer **all** the **five** questions following internal choice :

(5×10=50)

7. a) i) Explain in detail about biological and effective half-life.
ii) Define KERMA and absorbed dose. Derive the relation between the two under CPE. **(5+5)**

OR

- b) i) Define RAD and REM and state their units.
ii) Write about mass energy transfer and mass energy absorption coefficients. **(5+5)**

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8. a) i) Brief about Bragg-Gray and Spencer Attix cavity theories.
ii) Write about use of Quality Audit in reference and non-reference conditions. **(5+5)**

OR

- b) i) Give the general definition of $N_{D, W}$, K_{pol} , K_{Q, Q_0} and K_Q in TRS 398.
ii) Write about standardization of brachytherapy sources. **(6+4)**
9. a) i) Explain in detail about various standards of neutron dosimetry.
ii) Write a short note on neutron spectrometry. **(6+4)**

OR

- b) i) Define neutron dosimetry.
ii) Write about CR-39 dosimetry.
iii) Brief the mechanism of neutron survey meters. **(3+4+3)**
10. a) Explain about standardization of beta emitters and electron capture nuclides with proportional, GM and scintillation counters. **10**

OR

- b) i) Brief about windowless counting of liquid samples.
ii) Write about Re-entrant ionization chamber method counting. **(5+5)**
11. a) i) Write in detail about radiation chemistry of water and aqueous solutions.
ii) Describe the effects of radiation on polymers and their applications in dosimetry. **(5+5)**

OR

- b) i) Define molar absorption coefficient.
ii) Write in detail about Frick dosimeter.
iii) Write the applications of chemical dosimeters in Radiotherapy. **(2+4+4)**
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