

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

[AHS 1023]

OCTOBER 2023

Sub. Code: 4014

**M.Sc. MEDICAL PHYSICS
FIRST YEAR (From 2020-2021 onwards)
PAPER V – RADIATION DOSIMETRY AND STANDARDIZATION**

Q.P. Code: 284014

Time: Three Hours

Maximum: 100 marks

Answer ALL questions

I. Elaborate on:

(2 x 20 = 40)

1. Explain the IAEA TRS 398 calibration protocol for high-energy photon beams. Explain how IAEA's TRS-398 protocol differs from TG-51?
2. a) Mathematical derivation for Bragg-Gray theory principle.
b) Spencers-Attix and Burlin cavity theory.

II. Write notes on:

(10 x 6 = 60)

1. Dose equivalent, Ambient and directional dose equivalent.
2. Free air ionization chamber and its limitation.
3. Definition of calibration factors – N_X , N_K , $N_{D,air}$, $N_{D,w}$ in IAEA TRS277 protocol.
4. Compare characteristics of the proportional counter, GM counter and scintillation counters.
5. Transient charge particle equilibrium.
6. Scintillation counting methods of alpha, beta and gamma emitter.
7. Two voltage methods for continuous and pulsed beams.
8. Radiochemistry of water, aqueous solutions and peroxy radicals.
9. Beer – Lambert's law and applications of chemical dosimeters in radiotherapy.
10. Manganese sulphate bath system.
