(每題 10 分，共十題)

1. What is electron capture?

2. Monte Carlo (MC) programs simulation can be used to simulate the dose deposition in radiation therapy, photon detection in nuclear medicine, etc. What are the advantages and limitations of using MC simulation?

3. Under a low counting background, the average count rate is 3 cpm. What is the possibility to record 4 counts in a 2 minutes counting period. (the Poisson distribution s expressed as

$$P(X = x) = \frac{m^x e^{-m}}{x!})$$

4. During the course of radiotherapy, a tumor containing 10^{11} cells receives 50 Gy. If the D_0 is 4 Gy, what is the % chance of tumor cure?

5. Define the attenuation coefficient, the energy transfer coefficient, and the energy absorption coefficient for photon interactions. Provide relations among these coefficients.

6. Explain why a very low kVp is used for diagnostic mammography?

7. What is pair production?

8. What is "continuous slowing down approximation range"?

9. Describe a cyclotron.

10. Compare brachytherapy and teletherapy.