



**UNIVERSITI KUALA LUMPUR  
ROYAL COLLEGE OF MEDICINE PERAK**

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**FINAL EXAMINATION  
MARCH SEMESTER 2026**

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**COURSE CODE** : RXD13003  
**COURSE NAME** : RADIATION PROTECTION AND RADIOBIOLOGY  
**PROGRAMME NAME** : DIPLOMA IN MEDICAL IMAGING  
**DATE** : 29 JUNE 2026  
**TIME** : 9.00 A.M – 11.00 A.M  
**DURATION** : 2 HOURS

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**INSTRUCTIONS TO CANDIDATES**

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1. Please read **CAREFULLY** the instructions given in the question paper.
2. This question paper has information printed on both sides of the paper.
3. This question paper consists of **TWO (2)** section; Section A and Section B.
4. Answer **ALL** questions in Section A. For Section B, answer **THREE (3)** questions **ONLY**.
5. Please mark/write your answers on the OMR answer script or answer booklet provided.
6. Answer **ALL** questions in English language **ONLY**.

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**THERE ARE 8 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.**

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**SECTION A: MULTIPLE CHOICE QUESTIONS (Total: 25 marks)****INSTRUCTION: Answer ALL questions.****Please use the objective answer sheet provided.**

1. Identify the unit used to measure exposure (X).
  - A. Gray
  - B. Sievert
  - C. Becquerel
  - D. Coulomb / kg
2. Identify the SI unit of radioactivity.
  - A. Gray (Gy)
  - B. Sievert (Sv)
  - C. Roentgen (R)
  - D. Becquerel (Bq)
3. Which of the following statements best describes the function of the tissue weighting factor (WT) in radiation protection?
  - A. It determines the rate of radioactive decay.
  - B. It indicates the intensity of radiation exposure.
  - C. It measures the amount of energy absorbed by tissues.
  - D. It reflects the relative sensitivity of different organs to radiation.
4. Recognise the total sum of all tissue weighting factors (WT).
  - A. 0.5
  - B. 1.0
  - C. 10
  - D. 100
5. Why is effective dose important in radiation protection?
  - A. It determines decay rate.
  - B. It calculates exposure in air.
  - C. It measures radiation intensity.
  - D. It estimates whole body radiation risk.

6. Recognise the primary site of radiation damage in the cell.
- A. Cytoplasm
  - B. Mitochondria
  - C. Nucleus (DNA)
  - D. Cell membrane
7. Recognise the phase of the cell cycle that is the most radiosensitive.
- A. G1 phase
  - B. S phase
  - C. M phase
  - D. Resting phase
8. Define linear energy transfer (LET).
- A. Speed of radiation.
  - B. Radiation exposure time.
  - C. Dose received by patient.
  - D. Energy deposited per unit length of tissue.
9. Recognise the effect of high LET radiation on biological tissue.
- A. Has no effect on DNA structure.
  - B. Produces minimal ionisation in tissue.
  - C. Causes greater biological damage to cells.
  - D. Increases temperature without cellular damage.
10. Recognise the factor that increases radiosensitivity.
- A. Slow cell division.
  - B. Low oxygen level.
  - C. High oxygen level.
  - D. High differentiation.
11. Recognise a tissue that is highly radiosensitive.
- A. Bone
  - B. Muscle
  - C. Bone marrow
  - D. Nervous tissue

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17. Select the main function of a primary barrier.
- A. Increase exposure.
  - B. Reduce image quality.
  - C. Block the primary x-ray beam.
  - D. Protect from scattered radiation only.
18. Recognise the purpose of a lead apron.
- A. Produce x-rays.
  - B. Detect radiation.
  - C. Increase radiation dose.
  - D. Absorb scattered radiation.
19. Recognise the effect of increasing the lead thickness in shielding.
- A. No effect.
  - B. Radiation increase.
  - C. Radiation decrease.
  - D. Radiation remains unchanged.
20. Recognise the function of a control booth in an x-ray room.
- A. Stores equipment.
  - B. Produces radiation.
  - C. Increase beam intensity.
  - D. Protects staff from scattered radiation.
21. Recognise the fundamental principle of radiation protection.
- A. Exposure
  - B. Reflection
  - C. Absorption
  - D. Justification
22. Recognise the authority responsible for controlling medical use of ionising radiation in Malaysia.
- A. Ministry of Health (MOH)
  - B. Ministry of Education (MOE)
  - C. Atomic Energy Licensing Board (AELB)
  - D. Malaysian Radiation Protection Association (MARPA)

23. Recognise the purpose of enforcement activities.
- A. Reduce inspections.
  - B. Eliminate regulations.
  - C. Promote radiation use.
  - D. Ensure corrective action for non-compliance.
24. Recognise the main activities carried out by radiation health and safety section of the AELB.
- I. Licensing
  - II. Monitoring
  - III. Enforcement
  - IV. Manufacturing
- |              |                   |
|--------------|-------------------|
| A. I and III | C. I, II and III  |
| B. II and IV | D. II, III and IV |
25. Recognise the purpose of licensing in radiation protection.
- A. Reduce equipment.
  - B. Eliminate radiation.
  - C. Control radiation applications.
  - D. Ensure compliance with requirements.

**SECTION B: MODIFIED ESSAY QUESTIONS (Total: 75 marks)**

**INSTRUCTION:** This section consists of **FOUR (4)** modified essay questions (MEQ).

You are required to answer **ONLY THREE (3)** questions in the answer booklet provided.

**Question 1**

- (a) Describe regarding absorbed dose (D) in radiation protection. (5 marks)
- (b) Explain the types of natural sources of radiation. (10 marks)
- (c) Discuss radiation protection practices during mobile x-ray procedures in wards. (10 marks)

**Question 2**

- (a) Regarding radiosensitivity:
- i. Define radiosensitivity. (2 marks)
  - ii. List **THREE (3)** characteristics of radiosensitive cells. (3 marks)
  - iii. Describe factors that influence radiosensitivity. (5 marks)
- (b) Describe the methods used to control radiation exposure. (5 marks)
- (c) Differentiate between clean, supervised, and controlled area in radiation protection. (10 marks)

**Question 3**

- (a) Describe the function of different radiation protective clothing used in medical imaging.  
(5 marks)
- (b) Regarding decontamination procedures:
- i. State the steps involved in the 'SWIMS' rule for managing a radioactive spill.  
(5 marks)
  - ii. Describe actions taken during area decontamination.  
(5 marks)
- (c) Explain the proper handling of personnel dosimeters in radiation protection practice.  
(10 marks)

## Question 4

- (a) Regarding radiation action at the cellular level:
- Define indirect action of radiation. (2 marks)
  - State the process of indirect action of radiation. (2 marks)

- (b) State the equivalent dose limit for workers and public from A to F as per table below:

| Type of tissue/organ | Workers | Public |
|----------------------|---------|--------|
| Whole body           | A       | B      |
| Lens of eye          | C       | D      |
| Skin                 | E       | F      |

(6 marks)

- (c) Describe early radiation effects. (5 marks)

- (d) Explain the responsibilities of radiation workers in maintaining radiation safety in the workplace. (10 marks)

END OF EXAMINATION PAPER