



BRAINWARE UNIVERSITY

Term End Examination 2024-2025

Programme – B.Sc.(MRIT)-2022

Course Name – Quality Control and Quality Assurance of Radiological Equipment
Including AERB Guidelines

Course Code - BMRITC603

(Semester VI)

Full Marks : 60

Time : 2:30 Hours

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question)

1 x 15=15

1. Choose the correct alternative from the following :

(i) Identify Main function of AERB is to describe ?

- | | |
|---|---------------------------|
| a) Safety assessment for granting licence | b) Regulatory Inspections |
| c) - Development of regulatory safety documents | d) All of these |

(ii) Identify The term ALARA was introduced by

- | | |
|---------|---------|
| a) ICRP | b) NCRP |
| c) IRPA | d) BARC |

(iii) Identify the correct option match with the properties of X-rays.

- | | |
|-----------------|------------------|
| a) invisible | b) visible |
| c) both a and b | d) none of these |

(iv) Define the Purpose of AERB

- | | |
|--|--|
| a) Ensure that radiation worker and public members are not exposed to excess of limit. | b) Reduce radiation exposure below limit |
| c) Both 1 and 2 | d) None of these |

(v) During X-ray diagnostics, the workers wear personal protective clothing? Which of the following choices explain the best protection?

- | | |
|---|---|
| a) an apron with a thickness of 0.25 lead-equivalent without a thyroid collar | b) an apron with a thickness of 0.25 lead-equivalent and a thyroid collar |
| c) an apron with a thickness of 0.35 lead-equivalent without a thyroid collar | d) an apron with a thickness of 0.35 lead-equivalent and a thyroid collar |

(vi) Identify which of the following is NOT a responsibility of a radiologic technologist concerning regulatory compliance?

- | | |
|---------------------------------|--|
| a) Maintaining patient records | b) Monitoring radiation dose levels |
| c) Interpreting imaging results | d) Ensuring patient safety during procedures |

- (vii) Identify What type of monitoring device is typically used for personnel monitoring
- a) Thermometer
 - b) Geiger counter
 - c) Dosimeter
 - d) Stethoscope
- (viii) Tell the function of a collimator in an X-Ray installation
- a) To produce X-rays
 - b) To focus the X-ray beam
 - c) To develop radiographs
 - d) o store patient data
- (ix) Identify the quality control test used to measure spatial resolution in digital radiography:
- a) Step wedge test
 - b) Line pair phantom test
 - c) Beam alignment test
 - d) Exposure linearity test
- (x) Explain the significance of the half-value layer (HVL) test in X-ray QA:
- a) It checks alignment of the collimator
 - b) It verifies exposure time
 - c) It assesses beam quality and filtration
 - d) It tests screen-film contact
- (xi) Choose the purpose of the Half-Value Layer (HVL) test in X-ray QA.
- a) To check collimator alignment
 - b) To measure beam penetration and filtration adequacy
 - c) To assess focal spot size
 - d) To determine contrast resolution
- (xii) Select the correct tolerance level for kVp accuracy in an X-ray machine as per AERB guidelines.
- a) $\pm 2\%$ of the set kVp
 - b) $\pm 5\%$ of the set kVp
 - c) $\pm 10\%$ of the set kVp
 - d) $\pm 15\%$ of the set kVp
- (xiii) Identify the correct test used to evaluate the uniformity of the X-ray beam intensity.
- a) Exposure linearity test
 - b) Beam alignment test
 - c) HVL test
 - d) Radiation leakage test
- (xiv) Select the maximum allowable limit of reproducibility error in exposure output.
- a) $\pm 2\%$
 - b) $\pm 5\%$
 - c) $\pm 10\%$
 - d) $\pm 15\%$
- (xv) Identify the purpose of the mA linearity test in QA.
- a) To evaluate beam alignment
 - b) To verify radiation output consistency with different mA settings
 - c) To check kVp accuracy
 - d) To test collimator function

Group-B

(Short Answer Type Questions)

3 x 5=15

2. Explain the role of the focal spot in image quality. (3)
3. Explain the role of QA in Diagnostic X-ray. (3)
4. List any four parameters commonly evaluated during an X-ray QA program. (3)
5. Describe the role of the radiologic technologist in maintaining QA standards. (3)
6. Differentiate between hardware-related and software-related artifacts in radiological imaging equipment with suitable examples. (3)

OR

Summarize the causes and prevention of motion artifacts in CT imaging. (3)

Group-C

(Long Answer Type Questions)

5 x 6=30

7. List and describe any five quality control tests used in digital radiography. (5)
8. Evaluate the role of equipment calibration in maintaining high image quality. (5)
9. Evaluate the effectiveness of MRI QC procedures in minimizing artifacts and equipment errors. (5)
10. Design a department-specific radiation safety protocol using ALARA principles. (5)

11. Illustrate the process of obtaining licenses to operate of fixed X-ray by designing a flowchart. (5)
12. Write How are radiology images stored and managed within a Picture Archiving and Communication System (PACS)? (5)

OR

Write the purpose of establishing a Radiology Quality Assurance Program (QAP)? (5)

LIBRARY
Brainware University
Sarasat, Kolkata -700125