BRAINWARE UNIVERSITY

Term End Examination 2025-2026

Programme – B.Sc.(MRIT)-2022/B.Sc.(MRIT)-2023

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 The term ALARA was introduced by
a) ICRP b) NCRP
c) IRPA d) BARC

(ii) Select the imaging modality is generally considered safe for pregnant patients due to its non-ionizing nature
a) X-ray b) Computed tomography (CT)
c) Magnetic resonance imaging (MRI) d) Positron emission tomography (PET)

(iii) Identify During pregnancy, which type of radiation is of particular concern for fetal health
a) Non-ionizing radiation b) Ultraviolet radiation
c) Ionizing radiation d) Microwave radiation

(iv) Identify the aspect which is NOT typically assessed during NABH accreditation
a) Patient safety and care b) Healthcare facility infrastructure
c) Hospital financial performance d) Medical equipment maintenance

(v) State The primary goal of the ICRP is to:
a) Promote the use of X-ray equipment b) Ensure all X-ray installations are certified
c) Prevent unnecessary exposure to ionizing radiation d) Certify radiation therapists

(vi) Identify What type of monitoring device is typically used for personnel monitoring
a) Thermometer b) Geiger counter
c) Dosimeter d) Stethoscope

(vii) Identify the primary purpose of quality assurance in diagnostic radiology:
a) To improve patient satisfaction b) To reduce the cost of equipment
c) To ensure consistent image quality and patient safety d) To increase the number of diagnostic procedures

(viii) Predict why filtration is essential in X-ray quality assurance:

a) To decrease the resolution
b) To remove low-energy photons that increase patient dose
c) To make the image appear sharper
d) To lower the cost of X-ray equipment

(ix) Select the frequency of checking kVp.

a) Yearly
b) Monthly
c) Once in 3 year
d) Once in 2 year

(x) Identify the correct positioning of the lead test tool while performing the collimator accuracy test.

a) At the center of the detector
b) At the edge of the detector
c) At a 45° angle to the detector
d) Parallel to the tube housing

(xi) State the ideal CT number of water obtained during a water phantom study.

a) −100 HU
b) 0 HU
c) +20 HU
d) +100 HU

(xii) Name the phantom used for comprehensive CT accreditation and quality assurance testing.

a) Water phantom
b) ACR phantom
c) Catphan
d) Tissue equivalent phantom

(xiii) Recall the acceptable tolerance limit for kVp accuracy in diagnostic X-ray equipment.

a) ± 2 kV
b) ± 3 kV
c) ± 5 kV
d) ± 10 kV

(xiv) Recognize which exposure parameter is varied to assess linearity of radiation output.

a) kVp
b) Exposure time
c) mA stations
d) Filtration

(xv) Identify the test used to evaluate the total filtration of an X-ray tube.

a) Linearity test
b) Timer accuracy test
c) HVL measurement
d) Leakage radiation test

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Write a short note on Deterministic Effects. (3)
3. Write the 9 QA test name done for X-ray QA. (3)
4. List and explain the parameters tested in Half-Value Layer (HVL) measurement for an X-ray machine. (3)
5. Identify two potential consequences of not performing routine QA in X-ray systems. (3)
6. Write the purpose of a radiation warning sign in an X-ray room? (3)

OR

Write the significance of a radiation interlock system in X-ray room planning (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Write the responsibilities of employer in diagnostic radiology? (5)
8. Explain CT room layout ? (5)
9. Define What are the potential risks associated with radiation exposure during pregnancy, and how can these risks be minimized? (5)
10. Write the role of a radiation safety officer in personnel and area monitoring ? (5)
11. Analyze the impact of motion artifacts in CT and MRI on diagnosis and image interpretation. (5)
12. Write a short note on Pre-Conception and Pre-Natal Diagnostic Techniques Act, 1994 ? (5)

OR

Summarize the concept of pregnancy and radiation protection according to WHO guidelines for radiation protection. (5)