

B.Sc. RADIOLOGY IMAGING TECHNOLOGY

(New syllabus – 2014-2015)

THIRD YEAR

**PAPER III – QUALITY CONTROL, RADIOBIOLOGY AND RADIATION
SAFETY IN RADIODIAGNOSIS / IMAGING**

Q.P. Code: 801838

Time: Three Hours

Maximum: 100 Marks

Answer all questions

I. Elaborate on: (3 x 10 = 30)

1. Explain in detail about the deterministic and stochastic effects of radiation.
2. Planning consideration for an angiographic equipment room and licensing with AERB.
3. Explain at least five main quality assurance procedures required for a Fluoroscopy machine.

II. Write notes on: (8 x 5 = 40)

1. Discuss about various safety accessories in an angiography suite.
2. Spinning top and step wedge.
3. Experimental setup to calculate the HVL for 100 kVp in a conventional X-ray machine.
4. Free air ionization chamber.
5. Basic principles of radiation safety.
6. Good work practice in a conventional radiography system.
7. How will you perform area surveillance in a catheterization lab?
8. AERB specifications for obtaining license for a CT machine.

III. Short answers on: (10 x 3 = 30)

1. Licensee.
2. Types of shielding materials in radiology.
3. Lead equivalence.
4. KERMA.
5. Tissue weighting factors.
6. Occupational dose limits.
7. Somatic effect.
8. Fluorescence.
9. Focal spot test.
10. Weekly permissible dose.

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Q.P. Code: 801838

Time: Three Hours

Maximum: 100 Marks

Answer all questions

I. Elaborate on:

(3 x 10 = 30)

1. Explain in detail about the biological effects of radiation.
2. Describe about the various radiation detectors used in radiology.
3. Write at least five main quality assurance procedures required for a conventional X-ray machine.

II. Write notes on:

(8 x 5 = 40)

1. TLD badge.
2. Dose reduction strategies in fluoroscopy.
3. CTDI measurement.
4. Dose limits – occupational and public.
5. Basic elements of radiation safety.
6. Tube current modulation in CT.
7. Grid alignment test.
8. Table top dose measurement.

III. Short answers on:

(10 x 3 = 30)

1. Absorbed dose.
2. ALARA.
3. Workload.
4. AERB.
5. CTDI.
6. Inverse square law.
7. Mutation.
8. Effective dose.
9. Use factor.
10. Filtration.

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Time: Three Hours

Maximum: 100 Marks

Answer all questions

I. Elaborate on:

(3 x 10 = 30)

1. Draw a neat diagram of a diagnostic X-ray room of 4 x 4.5 sqm with all safety measures. The number of patients per week is 600, the exposure parameters are 80k V and 20mAs for 2 films per patient. Calculate the workload and shielding for primary and secondary barrier assuming the room is located in a hospital setup. The weekly permissible scatter radiation dose at 1m is 0.1.
2. Describe in details the various steps to obtain registration of an X-ray machine with AERB.
3. Describe at least five main quality assurance procedures required for a CT scanner.

II. Write notes on:

(8 x 5 = 40)

1. Collimator alignment test.
2. Ionisation chamber.
3. Deterministic effect.
4. Test for X-ray output reproducibility.
5. Good work practices in CT.
6. Area surveillance in a CT scanner room – with neat diagram of a CT room.
7. How to monitor radiation dose to patient in fluoroscopy and CT?
8. GM counter.

III. Short answers on:

(10 x 3 = 30)

1. KERMA
2. Survey meter.
3. MPD.
4. Inverse square law.
5. HVL.
6. Total filtration.
7. Contamination monitor.
8. TLD.
9. Equivalent dose.
10. Radioactivity.

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Q.P. Code: 801838

Time: Three Hours

Maximum: 100 Marks

Answer all questions

I. Elaborate on:

(3 x 10 = 30)

1. Explain two broad categories of harmful effects of radiation.
2. Write about various tests, their frequency and tools required for quality assurance of radiographic units.
3. Write in detail about the different methods of personal monitoring and mention their advantages.

II. Write notes on:

(8 x 5 = 40)

1. AERB regulations on warning signs at a diagnostic X-ray room.
2. How to reduce patient dose in X-ray studies on children?
3. Maximum permissible dose limits for public and radiation worker.
4. How to assess radiation work load?
5. Importance of quality control in radiation safety.
6. Total filter estimation.
7. Leakage radiation.
8. Film storage quality control.

III. Short answers on:

(10 x 3 = 30)

1. Densitometer.
2. Timer linearity test.
3. Sensitometer.
4. CT dose index check.
5. Recommended thickness of protection devices like aprons, gonad shield, thyroid shield and gloves.
6. What is recommended total filtration required to operate X-ray tube safely?
7. Table top exposure rate and target to table distance in fluoroscopy.
8. Deterministic effect.
9. Dose limit for students/trainees.
10. Three steps of Quality control.

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Q.P. Code: 801838

Time: Three Hours

Maximum: 100 Marks

Answer all questions

I. Elaborate on:

(3 x 10 = 30)

1. Explain about the somatic and genetic effects of radiation with example.
2. Discuss the personnel requirement and responsibilities given in AERB safety code for diagnostic radiology.
3. Explain in detail Thermo Luminescent Dosimeter with diagram and also mention the advantages over film badge.

II. Write notes on:

(8 x 5 = 40)

1. What are the sources of internal radiation exposure?
2. Light field and X-ray field alignment test.
3. Write the specifications for protective devices used in diagnostic radiology department.
4. Explain briefly about sources of background ionizing radiation.
5. Explain the film screen contact test.
6. Central beam alignment test.
7. Registration of X-ray unit with AERB.
8. Linearity of mA assessment.

III. Short answers on:

(10 x 3 = 30)

1. Write briefly about phantoms.
2. Location of X-ray unit and area requirement for radiographic procedures.
3. Use and features of gonad shield.
4. Cumulative dose, why is this relevant in radiation safety?
5. How to check performance of a lead apron periodically?
6. What is lead equivalence?
7. What is Roentgen?
8. Three principles of radiation protection.
9. International agencies responsible for radiation safety.
10. Warning light and Placard.

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Q.P. Code: 801838

Time: Three Hours

Maximum: 100 Marks

Answer all questions

I. Elaborate on:

(3 x 10 = 30)

1. Name various tests for quality assurance of radiographic units. Write about linearity of mA and tube housing leakage.
2. Describe the procedure and methods of AERB regulatory requirements to design a diagnostic X-ray installation with neat layout sketch.
3. What is ALARA? Explain various methods to reduce patient dose in fluoroscopy.

II. Write notes on:

(8 x 5 = 40)

1. Quality assurance procedures of film processors.
2. Determination of focal spot size.
3. Role of radiation safety officer in quality control programme.
4. What are the early effects of radiation?
5. Internal exposure.
6. Effective dose.
7. Explain the principle and working of a pocket dosimeter.
8. Background radiation exposure.

III. Short answers on:

(10 x 3 = 30)

1. Gantry tilt assessment in CT.
2. Recommended mobile x-ray unit exposure cable length.
3. What are two building materials available for the construction of radiation protecting walls?
4. Thermo luminescence dosimeter.
5. What is the relationship between time and exposure?
6. Chromosome aberration.
7. Annual dose limit of radiation worker and pregnant radiation worker.
8. What are procedures and tools to reduce patient dose?
9. Equivalent dose.
10. Half value layer.

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

[LR 1220]

**DECEMBER 2020
(AUGUST 2020 EXAM SESSION)**

Sub. Code: 1838

**BACHELOR IN RADIOLOGY IMAGING TECHNOLOGY
THIRD YEAR**

(New Syllabus 2014-2015)

**PAPER III – QUALITY CONTROL, RADIOBIOLOGY & RADIATION SAFETY IN
RADIODIAGNOSIS / IMAGING**

Q.P. Code: 801838

Time: Three Hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate on:

(3 x 10 = 30)

1. Explain the role of technologist in setting a new X-ray unit in radiology department.
2. Explain the biological effects of non-ionizing radiation like ultrasound, lasers, IR, UV and magnetic fields.
3. Write any five quality assurance procedures required for conventional X-ray machines.

II. Write notes on:

(8 x 5 = 40)

1. Occupational exposure limits and dose limits to public.
2. Somatic effects and hereditary effects.
3. Film storage quality control.
4. Benefits of QA procedures in an imaging department.
5. Philosophy of Radiation protection, effects of time, Distance & Shielding
6. Different shielding materials.
7. Good work practices in CT.
8. Radiation incidents involving X-Ray equipment.

III. Short answers on:

(10 x 3 = 30)

1. G.M counters.
2. ALARA.
3. Use and features of gonad shield.
4. AERB.
5. ICRP.
6. Inverse square law.
7. Pocket dosimeter.
8. Effective dose.
9. Excitation and Ionization.
10. Surveymeter.

B.Sc. RADIOLOGY IMAGING TECHNOLOGY

THIRD YEAR (Regulation from 2014-2015)

**PAPER III – QUALITY CONTROL, RADIOBIOLOGY & RADIATION SAFETY IN
RADIODIAGNOSIS / IMAGING**

Q.P. Code: 801838

Time: Three Hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate on:

(3 x 10 = 30)

1. Write in detail about the different methods of monitoring and mention their advantages.
2. Explain in detail Thermoluminescent Dosimeter with diagram and also mention their advantages over film badge.
3. Explain in detail about the biological effects of Radiation.

II. Write notes on:

(8 x 5 = 40)

1. Ionization chamber.
2. AERB regulations on warning signs at a diagnostic x-ray room.
3. Grid alignment test.
4. Leakage radiation.
5. What are the sources of internal radiation exposure.
6. Film storage quality control.
7. Write the specifications for protective devices used in diagnostic radiology.
8. Determination of Focal spot size.

III. Short answers on:

(10 x 3 = 30)

1. MPD.
2. Inverse square law.
3. KERMA.
4. Mutation.
5. Densitometer.
6. Use factor.
7. Timer linearity test.
8. Work load.
9. Define Equivalent Dose.
10. Gantry tilt assessment in CT.

B.Sc. RADIOLOGY IMAGING TECHNOLOGY
THIRD YEAR (Regulation from 2014-2015)
PAPER III – QUALITY CONTROL, RADIOBIOLOGY & RADIATION SAFETY IN
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Q.P. Code: 801838

Time: Three Hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate on:

(3 x 10 = 30)

1. Write at least five main Quality Assurance procedures required for a conventional X-ray machine.
2. Explain two broad categories of harmful effects of radiation.
3. What is ALARA? Explain various methods to reduce patient dose in Fluoroscopy.

II. Write notes on:

(8 x 5 = 40)

1. Tablet top dose measurement.
2. Test for X-ray output reproducibility.
3. Dose limits-occupational and public.
4. Area surveillance in a CT scanner room with neat diagram.
5. Explain the Film screen contact test.
6. GM Counter.
7. TLD Badge.
8. Basic elements of radiation safety.

III. Short answers on:

(10 x 3 = 30)

1. Half Value Layer.
2. Phantoms.
3. Absorbed dose.
4. What is Lead equivalence?
5. Work load.
6. Three principles of radiation protection.
7. Filtration.
8. Contamination monitor.
9. Chromosome aberration.
10. Recommended mobile X-ray unit exposure cable length.

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

[AHS 0423]

APRIL 2023

Sub. Code: 1838

B.Sc. RADIOLOGY IMAGING TECHNOLOGY

THIRD YEAR (Regulation 2014-2015 onwards)

**PAPER III – QUALITY CONTROL, RADIOBIOLOGY & RADIATION SAFETY IN
RADIODIAGNOSIS / IMAGING**

Q.P. Code: 801838

Time: Three Hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate on:

(3 x 10 = 30)

1. Describe about the various Radiation detectors used in Radiology.
2. Explain about the somatic and genetic effects of Radiation with example.
3. Write about various tests, frequency and tools required for Quality Assurance of Radiographic Units.

II. Write notes on:

(8 x 5 = 40)

1. Dose reduction strategies in Fluoroscopy.
2. Tube current modulation in CT.
3. Total filter estimation.
4. Quality Control tests procedure of Mammography.
5. Occupational Exposure.
6. Contamination monitor.
7. What is the relationship between Time and Exposure?
8. Effective dose.

III. Short answers on:

(10 x 3 = 30)

1. Scintillation detector with example.
2. Radiation Weighting factor.
3. Annual Dose limits for Radiation workers.
4. Three steps of Quality control.
5. CT dose index check.
6. ALARA.
7. What are two building materials available for the construction of Radiation protecting walls?
8. Reasonability of Licensee.
9. Sensitometer.
10. Personnel Monitory Device - TLD badge.

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

[AHS 1123]

NOVEMBER 2023

Sub. Code: 1838

B.Sc. RADIOLOGY IMAGING TECHNOLOGY

THIRD YEAR (Regulation 2014-2015 onwards)

**PAPER III – QUALITY CONTROL, RADIOBIOLOGY & RADIATION SAFETY
IN RADIODIAGNOSIS / IMAGING**

Q.P. Code: 801838

Time: Three Hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate on: **(3 x 10 = 30)**

1. Discuss the personnel requirement and responsibilities as per AERB safety code for Diagnostic Radiology.
2. Write about any five tests, their frequency and tools required for Quality Assurance of Conventional X-ray Units.
3. Explain the biological effects of non-ionizing radiation like Ultrasound, Lasers, IR, UV and Magnetic fields.

II. Write notes on: **(8 x 5 = 40)**

1. Protective devices used in Diagnostic Radiology department.
2. How to reduce patient dose in X-ray studies on children?
3. Maximum permissible dose limits for Public and Radiation worker.
4. Somatic effects and hereditary effects.
5. Benefits of QA procedures in an imaging department.
6. Thimble Ion Chamber.
7. Responsibility of Radiology Safety Officer as per AERB code.
8. Good Work practice in Radiology.

III. Short answers on: **(10 x 3 = 30)**

1. Radioactivity.
2. Tissue weighting factor.
3. Stochastic effect.
4. Equivalent Dose.
5. Grid factor.
6. ICRP.
7. Chronic response.
8. LD 50 / 60.
9. Dose limit for students and trainees.
10. Warning light and symbol of Radiation.

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

[AHS 0424]

APRIL 2024

Sub. Code: 1838

B.Sc. RADIOLOGY IMAGING TECHNOLOGY

THIRD YEAR (Regulation 2014-2015 onwards)

**PAPER III – QUALITY CONTROL, RADIOBIOLOGY & RADIATION SAFETY
IN RADIODIAGNOSIS / IMAGING**

Q.P. Code: 801838

Time: Three Hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate on:

(3 x 10 = 30)

1. Explain the biological effect of Radiation.
2. Describe in details the various steps to register an X-ray machine with AERB.
3. Describe any five Quality Assurance procedures required for a CT scanner.

II. Write notes on:

(8 x 5 = 40)

1. How to reduce patient dose in X-ray studies on children?
2. Philosophy of Radiation protection, effects of time, Distance and Shielding.
3. Somatic effects and hereditary effects.
4. Write the specifications for protective devices used in diagnostic Radiology department.
5. Good work practices in CT.
6. Area surveillance in a CT scanner room – with neat diagram of a CT room.
7. Explain briefly about sources of background ionizing radiation.
8. Hereditary effects.

III. Short answers on:

(10 x 3 = 30)

1. Effective dose.
2. Survey meter.
3. Warning light and symbol.
4. Inverse square law.
5. HVL.
6. ALARA.
7. International agencies responsible for radiation safety.
8. TLD Badge.
9. Equivalent dose.
10. Dose limit for students/trainees.
