

[KY 016]

MAY 2011

Sub. Code: 4016

M.Sc. (MEDICAL PHYSICS) DEGREE EXAMINATION

FIRST YEAR

(Revised Regulations for Candidates admitted from 2010-2011)

PAPER VI – PHYSICS OF MEDICAL IMAGING

Q.P. Code: 284016

Time : Three Hours

Maximum : 100 marks

Answer ALL questions

I. Elaborate on:

(2 x 20 = 40)

1. Describe a modern x-ray tube and its function with diagram.
2. Describe the principle and function of a Magnetic resonance imaging system.

II. Write notes on:

(10 x 6 = 60)

1. Bremsstrahlung x-rays.
2. Full wave rectifier.
3. Role of filters in imaging.
4. Intensifying screens.
5. Digital radiography.
6. Mammography.
7. T1 & T2 weighted images.
8. Doppler ultrasound.
9. MRI artifacts.
10. Quality Assurance of CT scanner.

M.Sc. (MEDICAL PHYSICS) DEGREE EXAMINATION**FIRST YEAR****(Revised Regulations for Candidates admitted from 2010-2011)****PAPER VI – PHYSICS OF MEDICAL IMAGING****Q.P. Code: 284016****Time : Three Hours****Maximum : 100 marks****Answer ALL questions in the same order.****I. Elaborate on:**

	Pages (Max.)	Time (Max.)	Marks (Max.)
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- | | | | |
|---|----|---------|----|
| 1. Explain in detail about the methods of evaluating performance of a Grid. | 17 | 40 min. | 20 |
| 2. Explain in detail about any five artifacts produced in magnetic resonance imaging. | 17 | 40 min. | 20 |

II. Write Notes on:

- | | | | |
|--|---|---------|---|
| 1. Write any two QA tests for CT a equipment. | 4 | 10 min. | 6 |
| 2. What are the prime factors in radiography techniques and explain about the influence of prime factors on image quality. | 4 | 10 min. | 6 |
| 3. Explain in detail about transducer. | 4 | 10 min. | 6 |
| 4. Explain about thermionic emission and line focus principle. | 4 | 10 min. | 6 |
| 5. Explain in detail about photoelectric effect. | 4 | 10 min. | 6 |
| 6. What is filtration? Explain briefly about K-edge Molybdenum filters. | 4 | 10 min. | 6 |
| 7. Explain in detail about principle of image formation on film. | 4 | 10 min. | 6 |
| 8. Explain in detail about free induction decay. | 4 | 10 min. | 6 |
| 9. Explain in detail about computed radiography. | 4 | 10 min. | 6 |
| 10. Explain in detail about Modulation Transfer Function (MTF). | 4 | 10 min. | 6 |

M.Sc. (MEDICAL PHYSICS) DEGREE EXAMINATION**FIRST YEAR****(Revised Regulations for Candidates admitted from 2010-2011)****PAPER VI – PHYSICS OF MEDICAL IMAGING****Q.P. Code: 284016****Time : Three Hours****Maximum : 100 marks****Answer ALL questions in the same order.****I. Elaborate on:**

Pages (Max.)	Time (Max.)	Marks (Max.)
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1. (a) Explain the importance of filtration in radiography, types of filtrations and how filters are used in shaping the X-ray spectrum?

17	40 min.	20
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- (b) with the help of neat sketch explain the construction of radiographic film.

2. (a) Explain in detail about indirect and direct digital radiography.

17	40 min.	20
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- (b) Give the details about the various instrumentations used in mammography.

II. Write Notes on:

- | | | | |
|---|---|---------|---|
| 1. Rotating anode X-ray tube. | 4 | 10 min. | 6 |
| 2. Image intensifier. | 4 | 10 min. | 6 |
| 3. Limitations of projection imaging techniques. | 4 | 10 min. | 6 |
| 4. Automatic exposure control. | 4 | 10 min. | 6 |
| 5. Factors influencing the scatter radiation. | 4 | 10 min. | 6 |
| 6. Compare the Conventional and Rare earth screens. | 4 | 10 min. | 6 |
| 7. Factors influencing the radiographic contrast. | 4 | 10 min. | 6 |
| 8. Q.A in X-ray equipments. | 4 | 10 min. | 6 |
| 9. MRI safety. | 4 | 10 min. | 6 |
| 10. Color Doppler. | 4 | 10 min. | 6 |

[LC 0413]

APRIL 2013

Sub. Code: 4016

M.Sc. (MEDICAL PHYSICS) DEGREE EXAMINATION

FIRST YEAR

(Revised Regulations for Candidates admitted from 2010-2011)

PAPER VI – PHYSICS OF MEDICAL IMAGING

Q.P. Code: 284016

Time : Three Hours

Maximum : 100 marks

Answer ALL questions

I. Elaborate on:

(2 x 20 = 40)

1. (a) Explain the different methods which are used to overcome the limitation of projection radiography?
(b) Draw the primary radiological image and explain the differential attenuation of X-rays in human body.
2. Write the different Quality Assurance tests which are used in evaluate the conventional X-ray Equipments.

II. Write notes on:

(10 x 6 = 60)

1. Acoustic Coupling.
2. Grid Ratio.
3. Intensifying screens.
4. Modulation Transfer Function.
5. Rotating influencing the radiographic contrast.
6. Quality Assurance in Computed Tomography.
7. MRI.
8. Beryllium Filters.
9. Digital radiography.
10. Automatic Brightness Control.

[LD 1013]

OCTOBER 2013

Sub. Code: 4016

M.Sc. (MEDICAL PHYSICS) DEGREE EXAMINATION

FIRST YEAR

(Revised Regulations for Candidates admitted from 2010-2011 onwards)

PAPER VI – PHYSICS OF MEDICAL IMAGING

Q.P. Code: 284016

Time : Three Hours

Maximum : 100 marks

Answer ALL questions

I. Elaborate on:

(2 x 20 = 40)

1. (a) With the help of neat sketch explain the construction of intensifying screens, and give the advantages of rare earth screens compared to conventional screens.
(b) Explain in detail about the interaction of X-ray with human body.
2. (a) Explain the various factors that influence the contrast and resolution
(b) With the help of neat sketch explain the construction and working of modern rotating anode X-ray tube.

II. Write notes on:

(10 x 6 = 60)

1. Rectifiers.
2. Radiographic film.
3. T1 and T2 relaxation time.
4. Automatic exposure control.
5. QA in Diagnostic X-Ray Equipments.
6. Production and physical properties of ultrasound.
7. Limitation of projection radiography.
8. Filtration in radiography.
9. Computerized radiography.
10. Beam restrictors in radiography.

M.Sc. (MEDICAL PHYSICS) DEGREE EXAMINATION

FIRST YEAR

(Revised Regulations for Candidates admitted from 2010-2011 onwards)

PAPER VI – PHYSICS OF MEDICAL IMAGING

Q.P. Code: 284016

Time : Three Hours

Maximum : 100 marks

Answer ALL questions

I. Elaborate on:

(2 x 20 = 40)

1. Discuss in detail the principles of image formation in computed tomography scanner.
Describe the various generations CT scanner with special emphasis on multislice CT.
2. a) Explain in detail the principles and working of a rotating anode x-ray tube.
b) Discuss about the various reasons for x-ray tube failure.
c) Briefly discuss about the z-axis flying focal spot.

II. Write notes on:

(10 x 6 = 60)

1. Factors affecting image quality in CT.
2. Signal encoding in MRI.
3. Radiographic film.
4. Modulation Transfer Function.
5. Artefacts in computed radiography.
6. Gradient echo sequence.
7. Direct digital radiography.
8. Mammography equipment.
9. Types of radiographic grids.
10. Write a short note on digital subtraction angiography.

[LG 0415]

APRIL 2015

Sub. Code: 4016

M.Sc., MEDICAL PHYSICS DEGREE EXAMINATION
(Revised Regulations for Candidates admitted from 2010-2011 Batch onwards)
FIRST YEAR
PAPER VI – PHYSICS OF MEDICAL IMAGING

Q.P. Code : 284016

Time : Three hours

Maximum : 100 marks

I. Elaborate on :

(2 x 20 = 40)

1. Write briefly the various Quality Assurance tests used in the evaluation of conventional radiographic equipment.
2. Describe the imaging concepts and signal encoding steps in Magnetic resonance imaging.

II. Write notes on:

(10 x 6 = 60)

1. Reasons for grid cut off
2. Computed Radiography system
3. Indirect flat panel detectors
4. Mammographic equipment
5. Artifacts in MRI
6. Factors affecting image quality in digital radiography
7. Filtration in angiography
8. Doppler ultrasound
9. MRI artifacts
10. Multislice CT scanner principles

[LH 0415]

OCTOBER 2015

Sub. Code: 4016

M.Sc., MEDICAL PHYSICS DEGREE EXAMINATION
(Revised Regulations for Candidates admitted from 2010-2011 Batch onwards)
FIRST YEAR
PAPER VI – PHYSICS OF MEDICAL IMAGING

Q.P. Code: 284016

Time : Three hours

Maximum : 100 marks

I. Elaborate on : **(2 x 20 = 40)**

1. Explain in detail the principle and image formation in MRI. What are the various signal encoding steps used in generating an image. Explain a simple gradient echo sequence.
2. Explain in detail the construction and working of an image intensifier and applications in digital subtraction angiography.

II. Write notes on: **(10 x 6 = 60)**

1. Explain the various detector configuration and principle of Multislice CT.
2. Discuss in detail the working principle of computed radiography.
3. Radiographic film and H&D curve.
4. Discuss in detail the rotating anode xray tube. What are the current trends in tube technology?
5. Discuss about the image quality in DR.
6. Image artefacts in CT.
7. Modes of display in Ultrasound.
8. Explain in detail the function of High Frequency generator.
9. Explain in detail about the mammographic unit.
10. Discuss about the various types of grids.

[LI 0416]

APRIL 2016

Sub. Code: 4016

**M.Sc., MEDICAL PHYSICS DEGREE EXAMINATION
FIRST YEAR
PAPER VI – PHYSICS OF MEDICAL IMAGING**

Q.P. Code: 284016

Time : Three hours

Maximum : 100 Marks

I. Elaborate on : **(2 x 20 = 40)**

1. Explain in detail how an image is formed using ultrasound. Discuss about various types of probes used in clinical scanners and the different modes of imaging.
2. Explain in detail the various quality assurance procedures for a Computed tomography scanner.

II. Write notes on: **(10 x 6 = 60)**

1. Rotating anode x-ray tube.
2. Factors affecting image quality in digital radiography systems.
3. Discuss in detail the various beam restrictors used in radiographic imaging.
4. Image intensifier.
5. Explain in detail on manual film processing.
6. Direct DR system.
7. What are grids? Discuss on the various types of grid cut-off.
8. Artefacts in CT.
9. DAP and its relevance in Radiology.
10. Dose reduction strategies in CT.

[LJ 1016]

OCTOBER 2016

Sub. Code: 4016

**M.Sc. MEDICAL PHYSICS EXAMS
FIRST YEAR
PAPER VI – PHYSICS OF MEDICAL IMAGING**

Q.P. Code : 284016

Time : Three hours

Maximum : 100 Marks

I. Elaborate on:

(2 x 20 = 40)

1. Explain generation of computed tomography scanner.
2. Explain principle of ultrasound production and various modes of ultrasound imaging.

II. Write notes on:

(10 x 6 = 60)

1. Artifacts in computed tomography Imaging.
2. Transducer design in ultrasound.
3. Write a note on shielding in MRI.
4. T1 & T2 relaxation time in MRI.
5. Write note on X-ray quality assurance.
6. Scatter reduction in X-ray quality.
7. Interactions of X-rays with matter.
8. Tube design in mammography.
9. Construction of film and image formation in films.
10. Explain function of grid and its various types.

[LK 0517]

MAY 2017

Sub. Code: 4016

**M.Sc. MEDICAL PHYSICS EXAMS
FIRST YEAR
PAPER VI – PHYSICS OF MEDICAL IMAGING**

Q.P. Code : 284016

Time : Three hours

Maximum : 100 Marks

I. Elaborate on: **(2 x 20 = 40)**

1. Write in detail the various generations of CT scanner.
2. Describe the principle and function of a Magnetic resonance imaging system.

II. Write notes on: **(10 x 6 = 60)**

1. Role of filters in imaging.
2. Rotating anode X-ray tube.
3. Acoustic coupling.
4. Grid Ratio.
5. Discuss about the image intensifiers.
6. Discuss about the various factors that affect contrast and resolution.
7. Automatic Brightness control.
8. Discuss about the transducer used in ultrasound.
9. Write about the principle of image formation on films.
10. Write about Direct Digital Radiography.

[LL 1017]

OCTOBER 2017

Sub. Code: 4016

**M.Sc. MEDICAL PHYSICS EXAMS
FIRST YEAR
PAPER VI – PHYSICS OF MEDICAL IMAGING**

Q.P. Code: 284016

Time : Three hours

Maximum : 100 Marks

I. Elaborate on: **(2 x 20 = 40)**

1. Discuss in detail about the factors influencing the quality of X-ray image.
2. Describe about production of ultrasound and characteristics of transducers.

II. Write notes on: **(10 x 6 = 60)**

1. Differentiate T1 and T2 images.
2. Write about orthopan tomography.
3. Write about modulation transfer function.
4. Explain about advantages of air gap technique.
5. Write about latent image formation.
6. Automatic brightness control.
7. Explain about continuous spectrum.
8. Write about X-ray tube rating.
9. Write about high voltage circuits.
10. Explain about the necessity of filtration.

[LM 0518]

MAY 2018

Sub. Code: 4016

**M.Sc. MEDICAL PHYSICS EXAMS
FIRST YEAR
PAPER VI – PHYSICS OF MEDICAL IMAGING**

Q.P. Code: 284016

Time : Three hours

Maximum : 100 Marks

I. Elaborate on: **(2 x 20 = 40)**

1. Discuss in detail about various types of grids, function and their characteristics.
2. Describe about the various contrast media used in radiography, characteristics and their application.

II. Write notes on: **(10 x 6 = 60)**

1. Explain structure of double coated X-ray film.
2. Write about automatic exposure control.
3. Discuss the role of image intensifier tube in fluoroscopy.
4. Write about mammography.
5. Explain about density, contrast, speed, resolution, latitude.
6. Write about MRI safety.
7. Explain about acoustic coupling.
8. Explain the necessity of quality assurance in radiology imaging.
9. Write about beam restrictors.
10. Explain the function of kVp, mAs and SID.

[LN 1018]

OCTOBER 2018

Sub. Code: 4016

**M.Sc. MEDICAL PHYSICS EXAMS
FIRST YEAR
PAPER VI – PHYSICS OF MEDICAL IMAGING**

Q.P. Code: 284016

Time : Three hours

Maximum : 100 Marks

I. Elaborate on: **(2 x 20 = 40)**

1. Describe a modern X-ray tube and its function with a suitable diagram.
2. Describe the principle and function of a Magnetic resonance imaging system.

II. Write notes on: **(10 x 6 = 60)**

1. Write about any three Quality assurance procedures for CT scanners.
2. Continuous and characteristic spectra.
3. Automatic exposure control.
4. Write about the production and physical properties of ultrasound.
5. Discuss about the various factors that affect contrast and resolution.
6. Compare and contrast CR and DR systems.
7. Write about the films and image formation in films.
8. Discuss in detail about the different types of grids with diagrams.
9. Write in detail about the mammography unit.
10. Write about the dose reduction methods in CT.

[LP 1019]

OCTOBER 2019

Sub. Code: 4016

**M.Sc. MEDICAL PHYSICS EXAMS
FIRST YEAR
PAPER VI – PHYSICS OF MEDICAL IMAGING**

Q.P. Code: 284016

Time : Three hours

Maximum : 100 Marks

I. Elaborate on: **(2 x 20 = 40)**

1. Explain the function of Modern X-ray Tube.
2. Explain the principles and functions of Digital X-ray and how it differ from Conventional X-ray images?

II. Write notes on: **(10 x 6 = 60)**

1. What is Zero Radiography and Fluoroscopy?
2. Explain the minimum QA procedures in X-ray Unit.
3. What is T1 and T2 relaxation time in MRI?
4. Explain the X-ray Spectrum (Continues and Characteristic).
5. State the Safety Procedures in MRI unit.
6. Explain the filters used in Mammography.
7. Explain the scattered radiation reduction in X-ray.
8. Why Tungsten used in Cathode and Anode?
9. State the importance of Filters and Grids.
10. Write about Dental X-ray unit.

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

[AHS 0321]

MARCH 2021

Sub. Code: 4016

(OCTOBER 2020 EXAM SESSION)

M.Sc. MEDICAL PHYSICS

FIRST YEAR (From 2010-2011 onwards)

PAPER VI – PHYSICS OF MEDICAL IMAGING

Q.P. Code : 284016

Time: Three hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate notes on:

(2 x 20 = 40)

1. a) Explain in detail about the interaction of x-ray with human body.
b) With the help of neat sketch explain the construction and working of modern rotating anode x-ray tube.
2. Explain in detail the construction and working of an image intensifier and application in digital subtraction angiography.

II. Write Short Notes on:

(10x6 = 60)

1. Full wave rectifiers.
2. Reasons for grid cut off.
3. Image artifacts in MRI.
4. Write about Dental X ray unit.
5. Modes of display in ultrasound.
6. T1 AND T2 relaxation time.
7. Filtration in radiography.
8. Direct DR system.
9. Scatter reduction in x-ray quality.
10. Transducer design in ultrasound

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

[AHS 0222]

**FEBRUARY 2022
(OCTOBER 2021 EXAM SESSION)**

Sub. Code: 4016

M.Sc. MEDICAL PHYSICS

FIRST YEAR

(Candidates admitted from 2010-2011 onwards – Paper VI)

(Candidates admitted from 2020-2021 onwards – Paper VII)

PAPER VI & VII – PHYSICS OF MEDICAL IMAGING

Q.P. Code : 284016

Time: Three hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate notes on:

(2 x 20 = 40)

1. a) Give the details about the instruments used in Mammography.
b) Explain in detail about indirect and direct digital radiography.
2. Write the different quality assurance tests which are used to evaluate the Conventional x-ray equipments.

II. Write Short Notes on:

(10x6 = 60)

1. Explain in detail about Photoelectric effect.
2. Image intensifier.
3. Bremsstrahlung X-Rays.
4. Grid ratio.
5. Automatic exposure control.
6. Continuous and Characteristic spectra.
7. Color Doppler.
8. Interactions of x-rays with matter.
9. Role of filters in imaging.
10. MRI artifacts.
