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

[AHS 0122] JANUARY 2022 Sub. Code: 1851
(FEBRUARY 2021 & AUGUST 2021 EXAM SESSION)

B.Sc. RADIOGRAPHY AND IMAGING TECHNOLOGY
THIRD YEAR (Regulation 2018-2019)
PAPER I – EQUIPMENTS OF ADVANCED MODERN IMAGING MODALITIES
Q.P. Code : 801851

Time: Three hours **Answer ALL Questions** **Maximum: 100 Marks**

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

1. Describe in detail the various parts of Mammography equipment.
2. Discuss in detail the various generations of the CT Scanners. Mention the advantage of the multislice CT scanner over conventional CT.
3. Describe an ultrasound transducer with suitable diagram and elaborate the various types of ultrasound transducers.

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

1. CR Reader.
2. 3 Artifacts in CT.
3. Flip Angle.
4. Gamma camera.
5. Explain two radioisotopes used in Nuclear Medicine.
6. Physical principle of PET.
7. Image reconstruction in CT.
8. Pulse sequence in MRI.

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

1. Tomography.
2. Resonance.
3. Flip angle.
4. Bow-tie filter.
5. Larmour Frequency.
6. Tesla.
7. What is window width and window level?
8. Advantages of MRI over CT images.
9. Gradient coil.
10. CR image plate phosphor.

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

[AHS 0922] SEPTEMBER 2022 Sub. Code: 1851
(FEBRUARY 2022 & AUGUST 2022 EXAM SESSIONS)

B.Sc. RADIOGRAPHY AND IMAGING TECHNOLOGY
THIRD YEAR (Regulation from 2018-2019)
PAPER I – EQUIPMENTS OF ADVANCED MODERN IMAGING MODALITIES
Q.P. Code : 801851

Time: Three hours **Answer ALL Questions** **Maximum: 100 Marks**

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

1. Describe in detail the function of a digital subtraction angiography machine.
2. Explain in detail the basic imaging concepts in MR imaging.
3. Describe in detail about the physical principle of CT image formation.

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

1. Multi detector CT.
2. Principle of PET-CT.
3. Spin echo sequence.
4. Ultrasound transducer.
5. Indirect flat panel detectors.
6. Single Photon Emission Computed Tomography.
7. Bio effects of MRI.
8. Pitch.

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

1. Filtration.
2. B-Mode in ultrasound.
3. What are the uses of PACS?
4. Phased array transducer.
5. Define pixel in CT.
6. Mammographic X-Ray film.
7. Artifacts in MRI.
8. Half life.
9. Advantages of Gamma Camera over Rectilinear Scanner.
10. CTDI.

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

[AHS 0423] **APRIL 2023** **Sub. Code: 1851**

B.Sc. RADIOGRAPHY AND IMAGING TECHNOLOGY
THIRD YEAR (Regulation 2018-2019 onwards)
PAPER I – EQUIPMENTS OF ADVANCED MODERN IMAGING MODALITIES
Q.P. Code : 801851

Time: Three hours **Answer ALL Questions** **Maximum: 100 Marks**

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

1. Describe in detail the parts of MRI equipment. MRS protocol and image acquisition. Name few MRI artifacts.
2. Principles and functions of PET CT. Advantages and limitation of PET CT.
3. Describe about the priniciple of Piezo-electric effect. Discuss about types of Transducers. Various modes of Ultrasound.

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

1. Digital Breast Tomosynthesis (draw a diagram).
2. Computer Radiography (CR) reader.
3. Dual energy CT.
4. Magnification Mammography.
5. Describe in detail about the construction of Mammogram equipment.
6. Pulse sequences in MRI.
7. Protocol for CT Aortogram, CT Artifacts.
8. DSA basic principle.

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

1. Chemical shift artifact.
2. ECG gating.
3. Define TRUS. Explain in detail about the transducer used for TRUS.
4. Reverberation artifact in USG.
5. Bone Density Scan (DEXA).
6. Quality Assurance in Computed Tomography.
7. Windowing in CT.
8. Picture Archiving and Communication Systems (PACS).
9. Grey scale in CT.
10. Shimming.

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

[AHS 1123] **NOVEMBER 2023** **Sub. Code: 1851**

B.Sc. RADIOGRAPHY & IMAGING TECHNOLOGY
THIRD YEAR (Regulation 2018-2019 onwards)
PAPER I – EQUIPMENTS OF ADVANCED MODERN IMAGING MODALITIES
Q.P. Code: 801851

Time: Three hours **Answer ALL Questions** **Maximum: 100 Marks**

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

1. Discuss in detail the principle and working of a Gamma Camera.
2. Describe about construction and working of Mammographic X-ray equipment. Brief notes about X-ray beams and filters in Mammogram.
3. Discuss about types of Transducers. Various modes of Ultrasound. Add a note on Piezo-electric effect.

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

1. Dual energy CT.
2. Gradient Echo sequence.
3. Artifacts during MR imaging.
4. Types of magnets in MRI.
5. Explain Voxel.
6. Explain the physical properties of Ultrasound.
7. Explain fifth generation CT.
8. Explain various filters in X-Ray.

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

1. Scintillation detector.
2. Linear attenuation co-efficient.
3. What is the basic principle of DSA?
4. MR Angiography techniques.
5. TR and TE.
6. What is FID in MRI?
7. Compare conventional mammography with digital mammography.
8. Focused transducer.
9. Gradient coil.
10. CT number.

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

[AHS 0424] **APRIL 2024** **Sub. Code: 1851**

B.Sc. RADIOGRAPHY & IMAGING TECHNOLOGY
THIRD YEAR (Regulation 2018-2019 onwards)
PAPER I – EQUIPMENTS OF ADVANCED MODERN IMAGING MODALITIES
Q.P. Code: 801851

Time: Three hours **Answer ALL Questions** **Maximum: 100 Marks**

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

1. Discuss in detail the various generation of the CT Scanners. Mention the advantages of the multislice CT scanner over conventional CT.
2. Write in detail about Digital Breast Tomosynthesis (draw a diagram), its advantage and disadvantage. Write a brief note on Radiation dose in the Mammography.
3. Discuss in detail about Digital Radiography. Mention the advantages of Digital Radiography over Conventional Radiography.

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

1. USG artifacts.
2. Single Photon Emission Computed Tomography (SPECT) - basic principle.
3. Stereotactic biopsy.
4. Slice selection Gradient.
5. What is Radio Frequency Pulse? Write a note on MRS.
6. Slip Ring Technology.
7. Ultrasound properties.
8. Cyclotron – working principle.

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

1. Doppler Effect.
2. Role of heel effect in Mammogram.
3. Flip angle.
4. What is the advantage of 3 Tesla MRI over Lower Tesla?
5. Newer advancements in Pictured Archiving and Communication Systems (PACS).
6. MRI artifacts.
7. Basic principle of Acquiring TOF images.
8. Explain ECG gating. Write its use in imaging.
9. Oral MRI contrast.
10. Shimming.

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

[AHS 0125] **JANUARY 2025** **Sub. Code: 1851**

B.Sc. RADIOGRAPHY & IMAGING TECHNOLOGY
THIRD YEAR (Regulation 2018-2019 onwards)
PAPER I – EQUIPMENTS OF ADVANCED MODERN IMAGING MODALITIES
Q.P. Code: 801851

Time: Three hours **Answer ALL Questions** **Maximum: 100 Marks**

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

1. Discuss about Radiofrequency coils. Explain about signal encoding for image formation in MRI.
2. Ultrasound transducer. Enumerate the various types of Ultrasonography probes used in imaging.
3. Explain the Generations of CT. Draw suitable diagrams.

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

1. Discuss about any three Artifacts in MRI.
2. Explain CT windowing.
3. Discuss in detail the principle and working of a Gamma camera.
4. MR angiography techniques.
5. CT gaiting.
6. Single Photon Emission Computed Tomography (SPECT).
7. Radio isotopes generator.
8. Temporal filtering method in DSA.

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

1. What are the uses of PACS?
2. TR and TE in MRI.
3. Define Gauss and Tesla.
4. Colour Doppler.
5. Bone densitometry.
6. Detectors in CT.
7. T2W imaging.
8. Compare conventional mammography with digital mammography.
9. Acoustic coupling.
10. Mammographic X-ray film.

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

[AHS 0425] **APRIL 2025** **Sub. Code: 1851**

B.Sc. RADIOGRAPHY & IMAGING TECHNOLOGY
THIRD YEAR (Regulation 2018-2019 onwards)
PAPER I – EQUIPMENTS OF ADVANCED MODERN IMAGING MODALITIES
Q.P. Code: 801851

Time: Three hours **Answer ALL Questions** **Maximum: 100 Marks**

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

1. Discuss in detail the principle and working of a Gamma Camera.
2. Explain T1, T2 sequences. Write the factors affecting image quality in MRI in detail. What are the advantages of MRI over CT?
3. Describe in detail about the construction and working of Mammographic X-ray equipment. Write brief notes about X-ray beam and filters used in Mammogram.

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

1. Nuclear imaging in neuroendocrine tumours.
2. Role of 128 slice CT in imaging.
3. CT artifacts.
4. Image quality in CT.
5. Spin echo, Gradient sequence.
6. Role of Radiographers in DSA. What is Mask image? Explain.
7. Virtual bronchoscopy and colonoscopy reconstruction.
8. Chemical shift artifacts. What is wrap around artifact?

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

1. 3^{rd} and 5^{th} generation CT.
2. Scintillation detector.
3. What is Gadolinium? Mention its uses in imaging.
4. Quenching.
5. Ultrasound contrast.
6. Piezo-electric effect.
7. Gradient coil.
8. Grey scale in CT.
9. Passive shielding in MRI.
10. Picture Archiving and Communication Systems (PACS).

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

[AHS 1125] **NOVEMBER 2025** **Sub. Code: 1851**

B.Sc. RADIOGRAPHY & IMAGING TECHNOLOGY
THIRD YEAR (Regulation 2018-2019 onwards)
PAPER I – EQUIPMENTS OF ADVANCED MODERN IMAGING MODALITIES
Q.P. Code: 801851

Time: Three hours **Answer ALL Questions** **Maximum: 100 Marks**

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

1. Construction of modern X-ray tube with a note on filament circuit and autotransformer. Define electric power, transformer and its types with role of auto transformer in construction of X-ray tube.
2. Basic structure of PACS (Picture Archiving and Communication System), types of storage with advantages and limitations of PACS system.
3. Defectors of Computed Tomography Equipments.

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

1. Define Artefact. Discuss about any three artefacts in MDCT(Multidectector-CT).
2. Define Rectifier with its types in single phase and three phases.
3. Intracavitory, Endoluminal and Intraoperative scanners in USG.
4. Localization of Magnetic Resonance Signal.
5. Define 3D USG and mention any two uses.
6. Define radiopharmaceuticals. Name three radiopharmaceuticals with its uses.
7. Role of helium in MRI. Enumerate and detail any two quality maintenance check list for MRI machine.
8. Digital image processing.

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

1. Air gap technique with exposure parameter changes when used.
2. Charge coupled device and charge amplifiers in DR(Digital radiography).
3. Time Gain Compensation.
4. Focal spot sizes in Mammography.
5. T_1 and T_2 Weighted image
6. Doppler effect.
7. Quantum mottle.
8. Beam hardening artefact.
9. Piezoelectric crystal.
10. DEXA scan.

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