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Question Paper Code	12571
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B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2024

Eighth Semester

Electronics and Communication Engineering
20ECEL810 - MEDICAL IMAGING SYSTEMS

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

- | | Marks | K-Level | CO |
|--|-------|---------|-----|
| 1. A 20 year-old man visits his doctor, worried about his worsening diarrhoea, abdominal pain and blood in his stool. The doctor wonders if he may have an inflammatory bowel disease. Which kind of diagnostic imaging technology should the doctor use first to test his theory? | 2 | K2 | CO1 |
| 2. How do you distinguish between X-rays and Gamma rays? | 2 | K2 | CO1 |
| 3. What are X-rays? | 2 | K1 | CO2 |
| 4. State the difference between Ultrasound diagnosis and X-Ray diagnosis. | 2 | K2 | CO2 |
| 5. Is CT scan cross sectional imaging technique? | 2 | K1 | CO3 |
| 6. Name three most commonly used 3D reconstruction techniques in CT. | 2 | K2 | CO3 |
| 7. What are the 3 major types of radiation detectors? | 2 | K2 | CO4 |
| 8. Distinguish between CT and PET scan. | 2 | K2 | CO4 |
| 9. Brief the concept of wave propagation in biological tissues and how it differs from wave propagation in other media. | 2 | K2 | CO5 |
| 10. List out the key components of MRI instrumentation. | 2 | K1 | CO5 |

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

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|---|----|----|-----|
| 11. a) What is meant by dye in X-ray imaging? Why is it required? Give valid reasons. | 13 | K2 | CO1 |
| OR | | | |
| b) List out different types of angiograms. Describe why X-Ray exposure to the human body is highly hazardous. | 13 | K2 | CO1 |
| 12. a) i) What are the different types of medical imaging techniques? Explain each briefly. | 7 | K2 | CO2 |
| ii) Explain X-Ray Image Intensification of fluoroscopy with illustration. | 6 | K2 | CO2 |
| OR | | | |
| b) i) Write a short note on the X-ray tube, its internal and external structure. | 10 | K2 | CO2 |
| ii) What is rotating anode? | 3 | K2 | CO2 |

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

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13. a) What is back projection? Explain how it is used in CT to reconstruct the image. 13 K2 CO3

OR

b) How X-Rays are detected in CT scan to form a sectional image? Describe in detail with neat illustrations. 13 K2 CO3

14. a) Depict the anger camera and explain its function to detect a Gamma ray. 13 K2 CO4

OR

b) What is called a half-life period? List out different types of radiation detectors and explain any one of its type. 13 K2 CO4

15. a) Describe the principle behind the formation of images in Ultra sound medical imaging systems. 13 K2 CO5

OR

b) Discuss the advantages and limitations of various imaging modes, such as B-mode, Doppler mode, and electrograph, in medical ultrasound imaging applications. 13 K2 CO5

PART - C (1× 15 = 15 Marks)

16. a) Evaluate the advancements in MRI technology, such as ultra-high field MRI and parallel imaging techniques, and their impact on image quality, acquisition speed and clinical applications. 15 K4 CO6

OR

b) Analyze the principles fMRI and how it is used to study brain function, including the concept of blood oxygenation level-dependent (BOLD) contrast imaging. 15 K4 CO6