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Question Paper Code: 1216271

B.E. / B.Tech. DEGREE EXAMINATIONS, NOV / DEC 2024

Sixth Semester

Biomedical Engineering

U20BM603 – MEDICAL IMAGING TECHNIQUES

(Regulation 2020)

Time: Three Hours

Maximum: 100 Marks

Answer ALL questions

PART – A

(10 x 2 = 20 Marks)

1. State the principle behind the line focus principle in X-ray tube design and how it contributes to image quality.
2. List the applications of X-ray units.
3. What are the fundamental principles underlying tomography imaging techniques?
4. Differentiate between conventional imaging equipment and digital imaging equipment.
5. Recall the fundamental principles of magnetic resonance imaging (MRI).
6. Mention any four applications of functional MRI (fMRI) in biomedical applications.
7. Differentiate SPECT and PET.
8. Outline the use of radionuclide imaging in assessing medical imaging.
9. What is the CyberKnife system and how does it differ from traditional radiation therapy methods?
10. Name any two radiation measuring instrument used in radiation therapy.

PART – B

(5 x 16 = 80 Marks)

11. (a) Illustrate with the block diagram of an X-ray machine and components related to X-ray production. (16)

(OR)

- (b) Explain how X-ray image intensifier tubes enhance image brightness and contrast during real-time imaging procedures. (16)

12. (a) Describe the principles of spiral CT imaging and how it enables rapid volumetric data acquisition. (16)

(OR)

- (b) Summarize the back projection and iterative reconstruction methods used in CT imaging. (16)

13. (a) Explain the function of each component in the MRI system and their roles in producing high-quality images. (16)

(OR)

- (b) Describe the experimental design and data analysis methods used in fMRI studies to map brain function and connectivity. (16)

14. (a) Outline the operation and components of an Anger scintillation camera in nuclear imaging. (16)

(OR)

- (b) Discuss the non-imaging techniques in nuclear medicine, including clearance measurements, whole-body counting, and surface counting. (16)

15. (a) Illustrate the function and components of a linear accelerator in radiation therapy. (16)

(OR)

- (b) Explain various radiation measuring instruments with its advantages and limitations. (16)

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