

Registration Number:

Date & session:



ST. JOSEPH'S UNIVERSITY, BENGALURU -27

Physics Open Elective– IV SEMESTER

SEMESTER EXAMINATION: APRIL 2024

(Examination conducted in May/June 2024)

PHOE04: Medical Physics: the Arts and Science of Healing
(For current batch students only)

Time: 2 Hours

Max Marks: 60

This paper contains 2 printed pages and 2 parts

PART-A

Answer any FOUR questions. Each question carriers TEN marks

4×10=40

1. a) Explain the physics behind and the importance of systolic and diastolic pressure measurement for humans.
b) Write a brief note on the following bone diseases with a neat diagram:
 - (i) Osteomalysia
 - (ii) Paget's disease

(5+5)
2. a) Discuss the structure and function of neurons with a neat sketch.
b) Describe the working mechanism behind magnetic resonance imaging (MRI).

(5+5)
3. a) Discuss the workings of PET scans.
b) Write a short note on the biological effects of radioactivity.

(5+5)
4. Discuss some general trends and examples from recent years to illustrate the growing impact of big data analytics in medical physics.
5. a) What challenges and ethical considerations arise in the implementation of AI and machine learning algorithms in medical physics, especially in decision-making processes?
b) In what ways are AI and machine learning contributing to the early detection and prediction of diseases through the analysis of medical imaging and patient health records?

(5+5)

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PART-B

Answer any FOUR questions. Each sketch carriers FIVE marks

4×5=20

6. Explain the modes of heat transfer with a neat diagram.
7. Explain how the following figure relates to a CT scan.

Resulting gray-scale image on x-ray



8. With a neat sketch, Discuss the LINAC and its workings.
9. What do you mean by machine learning, discuss with some examples.
10. Sketch the following and label the parts.
 - (i) Blood vessels are in a hypertension state.
 - (ii) Pressure variations in the esophagus (food pipe) for solids and liquids.
 - (iii) Healthy and severe Alzheimer's affected brain.