

Reg. No.:



Y7676

Name:

University of Kerala

Fourth Semester FYUGP Degree Examination, May 2026

Discipline Specific Elective

PHYSICS

UK4DSEPHY204 - PHYSICAL ASPECTS OF DIAGNOSTICS

Academic Level: 200-299

2024 Admission

Time: 1 Hour 30 Minutes(90 Mins.)

Max. Marks: 42

**Part A. 6 Marks.Time:6 Minutes.(Cognitive Level:Remember(RE)/Understand(UN)) Objective Type. 1 Mark
Each.Answer all questions**

Qn No.	Question	CL	CO
1	State the specific range of Source to Skin distance used in teletherapy.	RE	1
2	List two major limitations of Magnetic Resonance Imaging	RE	2
3	Discuss space charge effect.	UN	1
4	In CT back projection, explain $1/r$ blurring?	UN	2
5	Interpret the significance of the attenuation equation $I = I_0 e^{-\mu x}$.	UN	1
6	Explain why hydrogen atoms are primarily used in MRI imaging	UN	2

Part B. 8 Marks.Time:24 Minutes.(Cognitive Level:Understand(UN)/Apply(AP))Short Answer. 2 marks each.Answer all questions

Qn No.	Question	CL	CO
7	Differentiate between pixel and voxel in CT imaging.	UN	2
8	Compare preloading and afterloading technique in Brachytherapy.	UN	1
9	Compute the Half Value Thickness (HVT) in centimetres if the linear attenuation coefficient of a specific lead apron is 0.693 cm^{-1} .	AP	1
10	Apply the concept of nuclear spin to explain signal generation in MRI	AP	2

Part C. 28 Marks.Time:60 Minutes (Cognitive Level:Apply(AP)/Analyse(AN)/Evaluate(EV)/Create(CR)) Long Answer:7 marks each.Answer all 4 Questions choosing among options * within each question

Qn No.	Question	CL	CO
11	A) Apply the concept of MRI imaging sequences to execute how different sequences influence image contrast OR B) Organize a basic MRI safety protocol for patients and technicians.	AP	2, 2
12	A) Analyse the differences between xenon gas detectors and solid-state detectors in CT scanners, focusing on how their efficiency, design, and image quality impact clinical performance. OR B) Compare the evolution of CT scanner generations and analyse each generation based on improved scan time, image quality, and artifact reduction.	AN	2, 2
13	A) Assess the advantages of using added filtration in diagnostic X-ray systems. OR B) Assess the generation of Bremsstrahlung radiation and characteristic radiation in x- ray spectra.	EV	1, 1
14	A) Design Tele - Cobalt Machine for radiation therapy. OR B) Formulate two treatment methods which can be used in radiation therapy using the concept of Source to Skin distance (SSD).	CR	1, 1