

QPCODE

Reg. No:.....

Name:.....

MAHATMA GANDHI UNIVERSITY, KOTTAYAM
MGU-UGP (HONOURS) REGULAR EXAMINATION NOVEMBER 2026
THIRD SEMESTER
DSE - MG3DSEPHYA04- Fundamentals of Medical Physics
(2025 ADMISSION ONWARDS)

Duration: 2 Hours

Maximum Marks: 50

Remember(K), Understand(U), Apply(A), Analyse(An), Evaluate(E), Create(C), Skill(S),
Interest(I) and Appreciation(Ap)

Students should attempt at least one question from each course outcome to enhance their overall
outcome attainability.

Part A

Short Answer Type Questions

Answer any 9 questions

Each question carries 2 marks

1. What are imaging modalities? [K] / [CO1]
2. Differentiate between screen film radiography and digital radiography. [U] / [CO1]
3. State the concept of wave-particle duality of electromagnetic radiation. [K] / [CO2]
4. State Einstein's mass–energy equivalence relation. What is the energy equivalent of 1 atomic mass unit? [K] / [CO2]
5. Define Compton scattering. Which type of electron usually participates in Compton scattering? [U] / [CO2]
6. Why is visible light not used in radiology? Name the imaging modality that uses gamma rays. [U] / [CO2]
7. Define magnetic flux and state its SI unit. [K] / [CO3]

8. What is meant by the magnetic moment of an atom or nucleus? [K] / [CO3]
9. Why is hydrogen-1 (^1H) particularly important in MRI? [U] / [CO3]
10. What is Magnetic Resonance Imaging (MRI)? [U] / [CO3]
11. What is the significance of T1 and T2 in generating tissue contrast? [U] / [CO3]
12. Define Nuclear Magnetic Resonance (NMR). [U] / [CO3]

[2 x 9 = 18]

Part B

Short Essay Questions

Answer any 4 questions

Each question carries 8 marks

13. Explain Doppler ultrasound imaging and give some applications. [U] / [CO1]
14. Briefly explain the working principle of computed tomography (CT) technique. [U] / [CO1]
15. Explain the photoelectric effect in detail. Describe the interaction of the incident photon with a bound electron and the subsequent emission of characteristic x-rays or Auger electrons. [U] / [CO2]
16. Compare photoelectric absorption, Compton scattering, and pair production with respect to the incident photon energy, interaction mechanism, energy transfer, dependence on atomic number/electron density, and significance in medical imaging. [A] / [CO2]
17. Compare diamagnetic, paramagnetic, and ferromagnetic materials with respect to their response to an applied magnetic field and give suitable examples. [A] / [CO3]
18. Describe the major components of an MR system and explain the function of each component. [U] / [CO3]

[4 x 8 = 32]