QP CODE:D 123038	Total Pages: 2	Name:
		Register No.

SECOND SEMESTER (CUFYUGP) DEGREE EXAMINATION APRIL 2025

(PHYSICS)

PHY2MN102 MODERN PHYSICS AND NUCLEAR PHYSICS

2024 Admission onwards

Maximum Time :2 Hours	Maximum Marks :70

Section A

All Questions can be answered. Each Question carries 3 marks (Ceiling : 24 Marks)

1	Discuss blackbody radiation and state Wien's displacement law.
2	Explain the difference between absorption and emission spectra
3	Explain de Broglie wavelength.
4	Discuss the significance of Compton effect
5	Explain the dual nature of light with experimental evidence.
6	Discuss the process of pair production using an equation
7	Define mass defect and explain its relation to nuclear stability.
8	What is a chain reaction? How is it controlled in a nuclear reactor?
9	Explain the principle of carbon dating and its applications.
10	Compare three different types of beta decay and role of neutrino in them.

Section B

All Questions can be answered. Each Question carries 6 marks (Ceiling : 36 Marks)

11	Discuss and derive Rayleigh-Jeans law and explain why it fails to explain blackbody radiation.
12	Describe the experimental setup and results of the double-slit experiment for electrons.
13	Examine why some combinations of neutrons and protons are more stable than others.
14	Explain the fine structure of hydrogen spectral lines using quantum numbers.
15	Describe the liquid drop model of the nucleus and its applications.
16	Examine Binding energy per nucleon curve with the help of the diagram.

17	Explain meson theory of nuclear forces and calculate mass of pion.
18	Calculate the activity of 1 mg of Radon-222. What will be it's activity after a week later?
	Section C
	Answer any ONE. Each Question carries 10 marks (1x10=10 Marks)
19	(a)Explain and derive the expression for the Compton shift. (b) Discuss the experimental verification of Compton effect.
20	(a) Describe the process of nuclear fusion in stars. (b) Explain the challenges in achieving controlled nuclear fusion on Earth.