

QP Code: D 122705		Total Pages: 2	Name:
			Register No.
<b>SECOND SEMESTER (CUFYUGP) DEGREE EXAMINATION, APRIL 2025</b>			
<b>PHYSICS</b>			
<b>PHY2MN102 - MODERN PHYSICS AND NUCLEAR PHYSICS</b>			
<b>2024 Admission onwards</b>			
Maximum Time : 2 Hours			Maximum Marks :70
<b>Section A</b>			
<b>All Questions can be answered. Each Question carries 3 marks (Ceiling : 24 Marks)</b>			
1	Identify ultraviolet catastrophe and how did Planck resolve it?		
2	Chart out the difference between phase velocity and group velocity?		
3	Explain ionization energy of an atom.		
4	Express orbital radii in Bohr atom.		
5	Discuss the difference between absorption and emission spectra.		
6	Describe the process of pair production.		
7	Calculate Binding energy per nucleon of Carbon-12.		
8	Discuss the use of radioisotopes in medicine and industry.		
9	Explain the biological effects of radiation and safety measures.		
10	What are magic numbers in nuclear physics? Why are they significant?		
<b>Section B</b>			
<b>All Questions can be answered. Each Question carries 6 marks (Ceiling : 36 Marks)</b>			
11	Explain and derive the expression for the Compton shift.		
12	Calculate the de Broglie wavelength for an electron moving at $10^6$ m/s.		
13	Explain photoelectric effect using quantum theory.		
14	Calculate the longest wavelength in the Balmer series of Hydrogen.		
15	Describe the shell model of the nucleus and its success in explaining nuclear properties.		
16	Explain the process of gamma decay and its role in nuclear transitions.		

17	Classify Nuclear fission and fusion with the help of examples and reaction equations.
18	Derive the Bethe-Weizsäcker semi-empirical mass formula and explain its terms.
<b>Section C</b>	
<b>Answer any ONE. Each Question carries 10 marks (1x10=10 Marks)</b>	
19	(a) Explain Bohr atom in view of electron waves in the atom. (b) Calculate energy levels and spectra of Hydrogen atom.
20	(a) Explain the role of moderators and control rods in a nuclear reactor. (b) Explain the need of breeder reactors.