QP CODE: D2BPH2502	**(Pages: 2)**	**Reg. No**	**: .....**
		Name	**: .....**

SECOND SEMESTER FYUGP EXAMINATION, APRIL 2026

(Regular/Improvement/Supplementary)

Discipline Specific Core (DSC) Courses - Minor

PHY2MN102 : MODERN PHYSICS AND NUCLEAR PHYSICS

(Credits: 4)

Time: 2 Hours **Maximum Marks: 70**

Section A

Answer the following questions. Each carries 3 marks (Ceiling: 24 marks)

1.	What is photon? Give two of its properties.	BL1	CO2
2.	Show graphically the variation of intensity of spectral line distribution with wavelength.	BL2	CO1
3.	A photon recoils back after striking an electron at rest. Calculate the change in wavelength of photon.	BL3	CO1
4.	Why classical physics failed to explain atomic stability?	BL2	CO3
5.	What do you mean by distance of closest approach? Derive an equation for distance of closest approach.	BL2	CO3
6.	What is the main difference between a proton-proton and neutron-proton interaction in the meson theory?	BL2	CO4
7.	What is the physical significance of Q value of nuclear reaction?	BL2	CO6
8.	What is the role of control rods in a fission reactor?	BL2	CO6
9.	Give three properties of neutrino.	BL1	CO5
10.	Define activity of a radioactive substance and state the units in which it is measured.	BL1	CO5

(PTO)

Section B			
Answer the following questions. Each carries 6 marks (Ceiling: 36 Marks)			
11.	Does pair production violate any conservation law? Discuss.	BL3	CO2
12.	Derive an equation for orbital electron wavelength and calculate the electron wavelength for Bohr radius of the hydrogen atom.	BL2	CO3
13.	How much energy is required to remove an electron in the n = 2 state from a hydrogen atom?	BL3	CO3
14.	Discuss the energy levels and spectra of Hydrogen atom.	BL2	CO3
15.	Use the semi empirical binding-energy formula to calculate the binding energy of $_{20}{}^{40}Ca$.	BL3	CO4
16.	What are magic numbers? List the evidences for the existence of magic numbers.	BL1	CO4
17.	What is unified atomic mass? Find its energy equivalent.	BL2	CO4
18.	The relative radio carbon activity in a piece of charcoal from the remains of an ancient campfire was 0.1 of contemporary specimen. How long ago did the fire occur? $T_{1/2}$ for radioactive carbon = 5760 years.	BL3	CO5
Section C			
Answer any one question. Each carries 10 marks (1 x 10 = 10 Marks)			
19.	What is photoelectric effect? How did Einstein explain photoelectric effect on the basis of quantum theory?	BL2	CO1
20.	Give a detailed account on triple alpha reaction with an example.	BL2	CO6
	CO : Course Outcome		
	BL : Bloom's Taxonomy Levels (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)		