Reg. No.: .....

Name: .....

University of Kerala

U9127

Second Semester FYUGP Degree Examination, April 2025

Discipline Specific Core Course

PHYSICS

UK2DSCPHY103 - Modern Physics

Academic Level: 100-199

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	Show the relation connecting half-life and disintegration constant.	RE	4
2	State one major inadequacy of classical physics in explaining black body radiation	RE	1
3	State Planck's hypothesis	UN	1
4	State law of radioactive decay.	UN	4
5	Write down the truth table of a three input OR gate.	UN	2
6	Outline the limitations of Bohr atom model.	UN	3

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	Explain the charge independent nature of nuclear force.	UN	4
8	Explain and illustrate Pauli's exclusion principle.	UN	3
9	**Calculate** the radius of the first permitted Bohr orbit in a hydrogen atom.	AP	3
10	Find the de Broglie wavelength associated with a 56 gm golf ball with velocity 36m/s?	AP	1

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) Using the vector atom model, determine the quantum numbers associated with an electron in the 3s-orbital of a magnesium atom. OR B) State and explain Bohr's atomic model and its postulates. Apply it to derive expressions for the radius and energy of an electron in the n^{th} orbit.	AP	3, 3
12	A) Explain the quantum numbers associated with the vector atom model. OR B) Examine the binding energy per nucleon graphs to explain why certain nuclei are more stable than others.	AN	3, 4
13	A) Critically evaluate the principles of radiocarbon dating. How does the decay of Carbon-14 help in determining the age of ancient artifacts and fossils? OR B) Justify the statement "Nuclear density is a constant for all nuclei".	EV	4, 4
14	A)	CR	2, 2

Qn No.	Question	CL	CO
	Plan the steps involved in the conversion of decimal number into binary numberGive any one example of (1)Conversion of integral decimal number into binary (2) Conversion of fractional decimal number into binary (3) Conversion of mixed decimal system into binary OR B) Design a step-by-step method to convert the binary number 101011 into octal format.		