Reg. No.: .....

Name: .....

University of Kerala

U8996

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

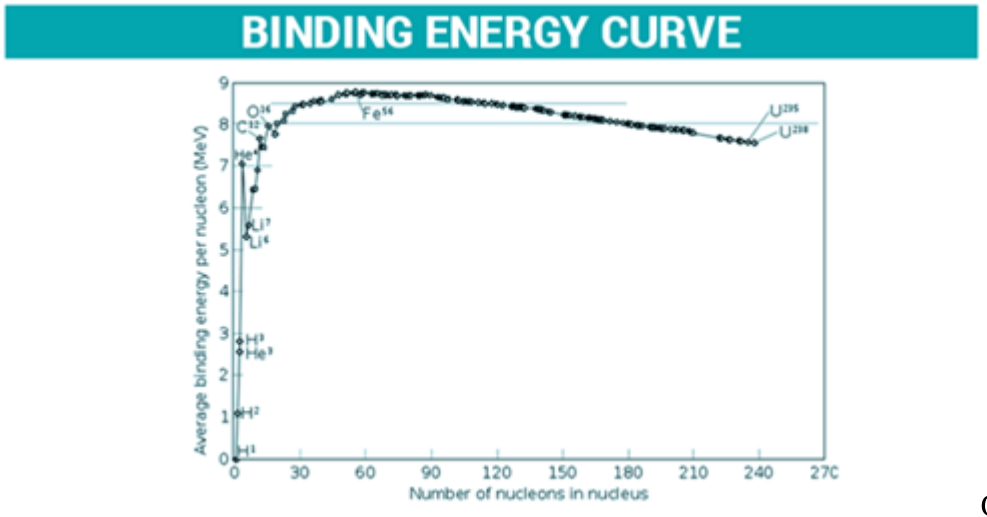
Qn No.	Question	CL	CO
1	**List** any two general properties of nuclei	RE	4
2	List any two experimental observations that classical physics could not adequately explain.	RE	1
3	Explain any two inadequacies of Classical Mechanics.	UN	1
4	Outline the basic properties of nucleus.	UN	1
5	Write down the truth table of a three input NAND gate.	UN	2
6	Explain the term spatial quantization.	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	**Discuss** the classification of nuclei	UN	4
8	Summarize quantum numbers needed to describe the state of an electron in an atom	UN	3
9	Identify the reason why the electron in a Bohr hydrogen atom is bound less tightly in energy level 3 than in energy level 1	AP	3
10	Employ the concept of the wave function for finding the probability of locating a particle in a specific region	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) Illustrate spectral series of hydrogen atom using an energy level diagram. Describe each series in detail. OR B) Explain the key features of the vector atom model and how it describes the angular momentum of electrons in an atom.	AP	3, 3
12	A) Deduce the equation mean life.	AN	4, 4

Qn No.	Question	CL	CO
	OR  B) Graph plotting binding energy per nucleon against atomic mass number(Binding Energy Curve) is shown.a. Analyse the graph and find Which nucleus most stable.Why?b. Why are lighter elements more likely to undergo fusion, while heavier elements undergo fission? Analyse the statement based on the binding enery curve		
13	A) The half-life of carbon-14 is 5730 years. How long will it take for 2 grams of pure carbon-14 to: a) lose 0.5 grams, and b) decay to only 0.01 grams remaining? OR B) Evaluate how the concept of half-life helps in determining the age of fossils and ancient objects.	EV	4, 4
14	A) Design logic circuit to realize the logical expression using basic logic gates, where A,B,C are inputs and Y is the output **(1). Y =A'B+C, (2). Y= (A+B).(A+C)** OR B) Generate a step-by-step method to find the 2's complement of a given binary number.	CR	2, 2