

Name:	
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2021

Course: Elements of Modern Physics
Course Code: PHYS 2009G
Programme: B.Sc (H) Chemistry, Mathematics & Geology
Total pages: 2

Semester: III
Max. Marks: 100
Time: 03 hrs.

Instructions:

- All questions are compulsory (**Q9** and **Q11** have an internal choice)
- Use blank paper as rough work to solve the questions in section-A and write only the correct options (type answers, no upload)
- Scientific calculators can be used for calculations.

SECTION-A

S. No.		Marks	CO
Q1.	The de-Broglie wavelength of virus particle of mass 1.5×10^{-15} kg moving at a speed of 2×10^{-3} m/s is (answer upto the third decimal) (use $h = 6.63 \times 10^{-34}$ J – s)	4	CO2
Q2.	Explain the two drawbacks of Rutherford's atomic model.	4	CO1
Q3.	Select all options that satisfy the properties of wave function ψ (a) the wave function must be single-valued (b) the wave function must be discontinuous (c) the wave function must be continuous (d) the wave function must be differentiable (e) the wave function must be infinite (f) the wave function must be finite valued (g) the wave function must be normalizable	4	CO1
Q4.	Calculate the work function in electron volts of a metal, given that the photoelectric threshold wavelength (a) 6200 Å and (b) 5000 Å (answer upto the second decimal) (use $h = 6.62 \times 10^{-34}$ J – s)	4	CO3
Q5.	The half-life of Radon is 3.8 days. After how many days will only one-twentieth of the radon sample be leftover. (answer upto the second decimal) (use $\log_{10} 20 = 1.3010$)	4	CO4

SECTION-B (Question No: 9 has an internal choice)

