No. of Printed Pages/Questions: 3/12

O.P. JINDAL SCHOOL, SAVITRI NAGAR

PERIODIC TEST – II (Round-1) (2025–26)

CLASS – XII **MAX. MARKS – 20**

SUBJECT – PHYSICS **MAX. TIME – 1 Hour**

- General Instructions:-

(i) All questions are compulsory. There are 12 questions in this question paper with internal choice.

(ii) SECTION – A: Question numbers 1 to 6 are MCQs, carrying 1 mark each.

(iii) SECTION – B: Question numbers 7 to 10 are short answer questions carrying 2 marks each.

(iv) SECTION – C: Question numbers 11 and 12 are long answer questions carrying 3 marks each.

(v) There will be internal choices in some of the questions of Section B and Section C.

Planck's constant (h) = 6.63×10^{-34} J·s Charge of electron (e) = 1.6×10^{-19} C

Mass of electron (me) = 9.1×10^{-31} kg Mass of proton (mp) = 1.67×10^{-27} kg

Rydberg constant (RH) = 1.097×10^{7} m^{-1} Speed of light (c) = 3.0×10^{8} m/s

SECTION – A (1 mark each)

1. The spectral line corresponding to the transition $n = 4$ *to second excited state* in hydrogen lies in:
   (a) Lyman series (b) Balmer series (c) Paschen series (d) Pfund series
2. The photoelectric current depends on:
   (a) Frequency of light (b) Work function (c) Intensity of light (d) Planck's constant
3. In the Bohr model of hydrogen atom, the relation between total energy (E) and kinetic energy (K) of the electron is:
   (a) $E = K$ (b) $E = -K$ (c) $E = -2K$ (d) $E = 2K$
4. What happens to the kinetic energy of photoelectrons when the intensity of incident light is doubled (frequency kept constant)?
   a)increase b) decrease c) remains same d) data insufficient
5. The work function of a metal is 2 eV. The threshold wavelength is:
   (a) 310 nm (b) 620 nm (c) 1240 nm (d) 1550 nm
6. Assertion (A) and Reason (R) type questions. Two statements are given one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer from the

codes (A), (B), (C) and (D) as given below

(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).

(c) Assertion (A) is true, but Reason (R) is false.

(d) Assertion (A) is false and Reason (R) is also false.

SECTION – B (2 marks each)

(Attempt any 3 questions. Internal choice provided.)

7. An electron is accelerated through a potential difference of 200 V. Find its de Broglie wavelength.

OR

Calculate the momentum of an electron having wavelength 0.5 nm.

8. Explain why photoelectric emission does not occur when the frequency of incident light is below the threshold frequency.

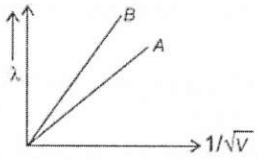
OR

Draw and explain the graph showing variation of stopping potential with frequency of incident light.

9. If total energy is −3.4 eV, find the corresponding potential and kinetic energies.

OR

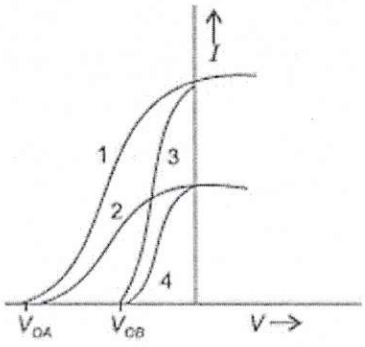
Two lines, A and B, in the plot given below show the variation of de Broglie wavelength, λ versus $1/\sqrt{V}$, where V is the accelerating potential difference, for two particles carrying the same charge. Which one of two represents a particle of smaller mass? 1



10. Light of wavelength 450 nm ejects photoelectrons from a metal surface having work function 2 eV. Calculate the maximum kinetic energy of the emitted electrons.

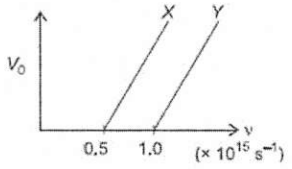
OR

The given graph shows the variation of photoelectric current (I) versus applied voltage (V) for two different photosensitive materials and for two different intensities of the incident radiation. Identify the pairs of curves that correspond to different materials but same intensity of incident radiation.



SECTION – C (3 marks each)

The following graph shows the variation of stopping potential V_0 with the frequency v of the incident radiation for two photosensitive metals X and Y:



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(i) Which of the metals has larger threshold wavelength? Give reason.

(ii) Explain, giving reason, which metal gives out electrons, having larger kinetic energy, for the same wavelength of the incident radiation.

(iii) If the distance between the light source and metal X is halved, how will the kinetic energy of electrons emitted from it change? Give reason.

OR

(a) Explain the limitations of Bohr's model of hydrogen atom.

(b) How did the concept of de Broglie waves improve our understanding of atomic structure?

12(a) Explain the terms **excitation energy** and **ionisation energy** of a hydrogen atom.

(b) Calculate the energy required to remove an electron from the **second orbit** of hydrogen

OR

Derive the radius of nth orbit of the hydrogen atom and show it is proportional to square of n