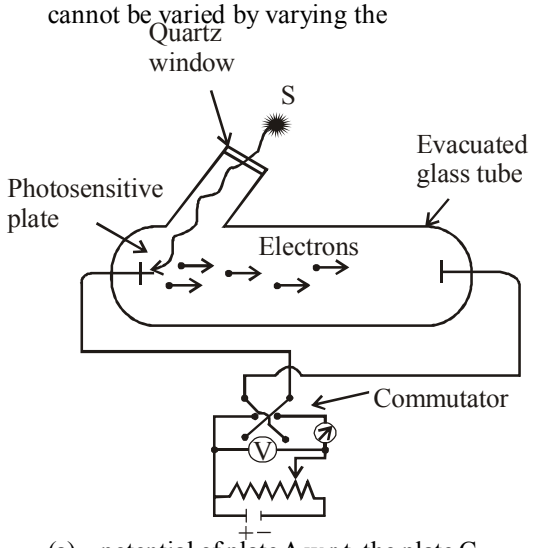
25 Dual Nature of Radiation and Matter

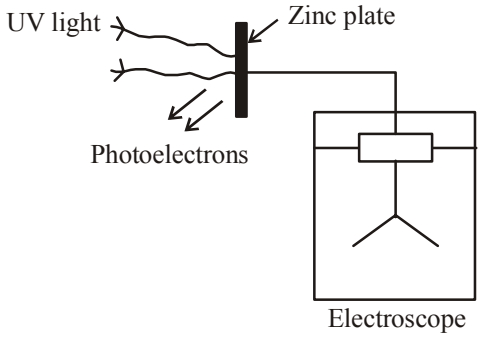
Diagram Based Questions :

1. In the given set-up, the photoelectric current cannot be varied by varying the



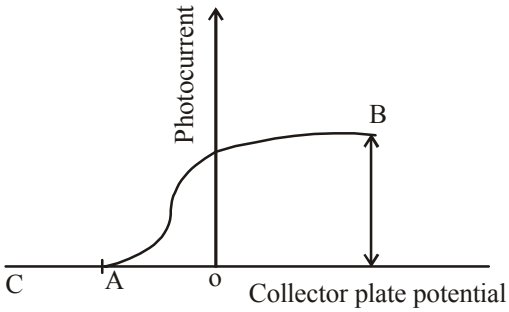
(a) potential of plate A w.r.t. the plate C
(b) intensity of incident light
(c) material of plate A
(d) material of plate C

2. In Hallwach's experiment on photoelectric emission with following setup, it was observed that



The zinc plate became _____ if initially negatively charged.
(a) positively charged
(b) negatively charged
(c) uncharged
(d) more positively charged

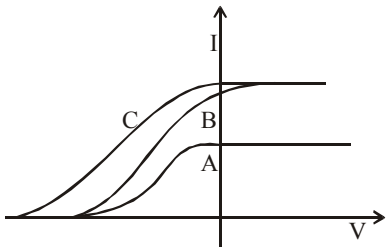
3. In the given graph of photoelectric current versus collector plate potential the quantities (A), (B), and (C) represent



(i)	A	(1) Retarding potential
(ii)	B	(2) Stopping potential
(iii)	C	(3) Saturation current

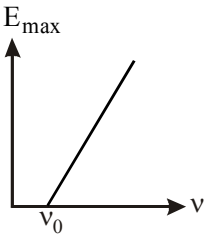
(a) (i) – 2; (ii) – 1; (iii) – 3
(b) (i) – 2; (ii) – 3; (iii) – 1
(c) (i) – 3; (ii) – 2; (iii) – 1
(d) (i) – 1; (ii) – 2; (iii) – 3

4. In a photoelectric experiment, anode potential (v) is plotted against plate current (I)



(a) A and B will have different intensities while B and C will have different frequencies
(b) B and C will have different intensities while A and C will have different frequencies
(c) A and B will have different intensities while A and C will have equal frequencies
(d) A and B will have equal intensities while B and C will have different frequencies

5. The maximum kinetic energy (E_{max}) of photoelectrons emitted in a photoelectric cell varies with frequency (ν) as shown in the graph. The slope of the graph is equal to



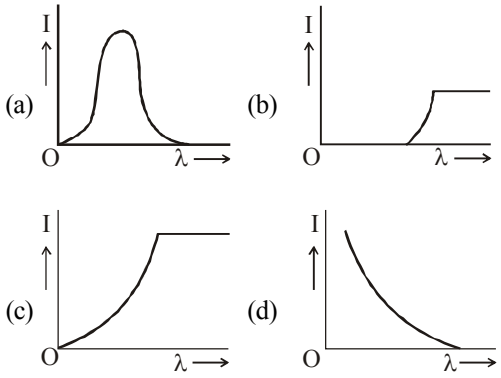
(a) charge of the electron

(b) $\frac{e}{m}$ of the electron

(c) work function of the emitter

(d) Plank's constant

6. The anode voltage of a photocell is kept fixed. The wavelength λ of the light falling on the cathode is gradually changed. The plate current I of the photocell varies as follows



Solution

1. **(c)** Changing the material of plate A will not affect the no. of photoelectrons emitted for the given material of plate C and intensity & frequency of light used.

2. **(c)** **3.** **(b)**

4. **(a)** From the graph it is clear that A and B have the same stopping potential and therefore the same frequency. Also B and C have the same intensity.

5. **(d)** Intensity $\propto 1/(\text{distance})^2$; No. of photoelectrons emitted is proportional to intensity of incident light.

6. **(d)** As λ is increased, there will be a value of λ above which photoelectrons will be cease to come out so photocurrent will become zero. Hence **(d)** is correct answer.