INDIAN SCHOOL MUSCAT

CLASS :……XII……

SUBJECT:……Physics……..

WORKSHEET

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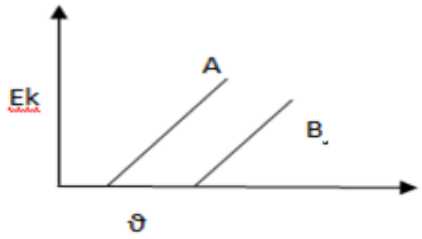
DATE :……

TOPIC/SUB-TOPIC :…….Dual nature of Matter and Radiation……..

Section A Conceptual and application type questions

1	What is the stopping potential applied to a photocell if the maximum kinetic energy of a photoelectron is 5eV ?	1
2	Work functions of two metals A and B are 4eV and 10 eV respectively . Which metal has the higher threshold wavelength ?	1
3	Two beams ,one of red light and the other of blue light , of same intensity incident on a metallic surface to emit Photoelectrons. Which one of them emits electrons of greater kinetic energy?	1
4	How does the stopping potential of a Photo cell change ,when i) the intensity of the incident radiation is halved? Ii) frequency of incident radiation increases ?	1
5	If the potential difference used to accelerate electrons is tripled , by what factor the de Broglie wavelength of electron beam change?	1
6	An electron and proton have the same kinetic energy .Which one of them has the larger de Broglie wavelength.	1
7	An alpha particle and a proton are accelerated from rest by the same potential. Find the ratio of their de Broglie wavelengths.	
8	Show graphically the variation of de Broglie wavelength λ of an electron with i)√V ii) V where V is the potential through which an electron is accelerated from rest.	2
9	Why Caesium oxide is coated on the cathode of Photo electric cell?	2
10	The figure shows plot of Kinetic energy of photo electrons emitted with the frequency of incident radiation for two photosensitive materials A and B . i) Which of them has more threshold wave length? ii) Which of them has more work function? iii) From which electrons will be emitted with more kinetic energy?	3



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Section B Numerical problems

1 A metallic surface when illuminated with light of wavelength 3333 Å emits electrons with energies upto 0.6 eV. Calculate the work function of the metal.. 2

2 . 2
Monochromatic light of frequency 6.0×10^{14} Hz is produced by a laser. The power emitted is 2.0×10^{-3} W. (a) What is the energy of a photon in the light beam? (b) How many photons per second, on an average, are emitted by the source?

3 The work function of Iron is 4.7eV. Calculate the cut off frequency and the corresponding cut off wave length for this metal. 2

4 X rays of wavelength λ fall on a photo sensitive surface emitting electrons .Assuming that the work function of the surface can be neglected ,prove that the de Broglie wave length of electrons emitted would be $\sqrt{\frac{h\lambda}{2mC}}$ 2

5 The de-Broglie wavelength of a photon is same as the wavelength of an electron. Show that the kinetic energy of photon is 2 λmC/h times the kinetic energy of electron,where m is the mass of electron and C is the speed of light. 2

6 An electromagnetic wave of wavelength λ is incident on a photosensitive surface of negligible work function. If the Photo electrons emitted from the surface have De-Broglie wavelength λ_1 prove that $\lambda = (2mC/h)\lambda_1^2$. 2

7 The work function of Iron is 4.7eV. Calculate the cut off frequency and the corresponding cut off wave length for this metal. 2

8 The work function of zinc is 6.8×10^{-19} J. What is the threshold frequency for emission of photoelectrons from zinc? 1

9 A particle is moving three times as fast as an electron . The ratio of the de Broglie wavelength of the particle to that of the electron is 1.813×10^{-4} Calculate the particle's mass and identify the particle. 2