PHYSICS

BOOKS - UNIVERSAL BOOK DEPOT 1960 PHYSICS (HINGLISH)

ELECTRON, PHOTON, PHOTOELECTRIC EFFECT AND X-RAYS

Exercise

1. In the Millikan's experiment, the distance between two horizontal plates is 2.5 cm and the potential difference applied is 250 V .The electric field between the plates will be

A. 900 V/m

B. 10000 V/m

C. 625 V/m

D. 6250 V/m

Answer: B

Watch Video Solution

2. A particle has a mass 400 times than that of the elctron and charge is double than that of aelectron. It is accelerated by $5V$ of potential difference. Initially the particle was at rest, then its final kinetic energy will be

A. 5 eV

B. 10 eV

C. 100 eV

D. 2000 eV

Answer: B

Watch Video Solution

3. An electron (charge $= 1.6 \times 10^{-19}$ coulomb) is accelerated through a potential of $1, 00, 000$ volts. The energy required by the electron is

A. $1.6 \times 10^{-24} J$

B. $1.6 \times 10^{-14} erg$

C. $0.53 \times 10^{-17} J$

D. $1.6 \times 10^{-14} J$

Answer: D

Watch Video Solution

4. While doing his experiment, Millikan one day observed the following charges on a single drop

(i) $6.563 \times 10^{-19} C$

(ii) $8.204 \times 10^{-19} C$

(iii) $11.50 \times 10^{-19} C$

(iv) $13.13 \times 10^{-19} C$

(v) $16.48 \times 10^{-19} C$

(vi) $18.09 \times 10^{-19} C$

From this data the value of the elementary charge (e) found to be

A. $1.641 \times 10^{-19} C$

B. $1.630 \times 10^{-19} C$

C. $1.648 \times 10^{-19} C$

D. $1.602 \times 10^{-19} C$

Answer: A

Watch Video Solution

5. In an electron gun the control grid is given a negative potential relative to cathode in order to

A. Decelerate electrons

B. Repel electrons and thus to control the number of electrons passing through it

C. To select electrons of same velocity and to converge them along the axis

D. To decrease the kinetic energy of electrons

Answer: B

Watch Video Solution

6. The ratio of moment of an electron and an α-particle which are accelerated from rest by a potential difference of $100V$ is

A. 1

B. $\sqrt{\frac{2m_e}{m_\alpha}}$

C. $\sqrt{\frac{m_e}{m_\alpha}}$

D. $\sqrt{\frac{m_e}{2m_\alpha}}$

Answer: D

Watch Video Solution

7. When subjected to a transverse electric field, cathode rays move

A. Down the potential gradient

B. Up to potential gradient

C. Along a hyperbolic path

D. Along a circular path

Answer: B

Watch Video Solution

8. The fact that electric charges are integral multiples of the fundamental electronic charge was proved experimentally by

A. Planck

B. J.J. Thomson

C. Einstein

D. Millikan

Answer: D

Watch Video Solution

9. In Millikan oil drop experiment, a charged drop of mass $1.8 \times 10^{-14} kg$ is stationary between its plates. The distance between its plates is $0.90 cm$ and potential difference is 2.0 kilo volts. The number of electrons on the drop is

A. 500

B. 50

C. 5

D. 0

Answer: C

Watch Video Solution

10. The charge on electron was discovered by

A. J.J. Thomson

B. Neil Bohr

C. Millikan

D. Chadwick

Answer: C

Watch Video Solution

11. From the following, what charges can be present on oil drops in Millikan's experiment ?

A. Zero, equal to the magnitude of charge on $\alpha-$ particle

B. $2e, 1.6 \times 10^{18} C$

C. $1.6 \times 10^{-19} C, 2.5e$

D. $1.5e, e$

Answer: B

Watch Video Solution

12. A narrow electron beam passes undeviated through an electric field $E = 3 \times 10^{4} \text{volt} / m$ and an overlapping magnetic field $B = 2 \times 10^{-3} Weber / m^{2}$. If electric field and magnetic field are mutually perpendicular. The speed of the electron is

A. 60 m/s

B. $10.3 \times 10^{7} m / s$

C. $1.5 \times 10^{7} m / s$

D. $0.67 \times 10^{-7} m / s$

Answer: C

Watch Video Solution

13. In Thomson's method of determining e/m of electrons

A. Electric and magnetic fields are parallel to electrons beam

B. Electric and magnetic fields are perpendicular to each other and perpendicular to electrons beam

C. Magnetic field is parallel to the electrons beam

D. Electric field is parallel to the electrons beam

Answer: B

Watch Video Solution

14. Cathode rays enter into a unifrom magnetic field perpendicular to the direction of the field. In the magnetic field their path will be

A. Straight line

B. Circle

C. Parabolic

D. Ellipse

Answer: B

Watch Video Solution

15. The specific charge of an electron is

A. 1.6×10^{-19} coulomb

B. 4.8×10^{-10} statcoulomb

C. 1.76×10^{11} coulomb/kg

D. 1.76×10^{-11} coulomb/kg

Answer: C

Watch Video Solution

16. An electron is moving with constant velocity along x-axis. If a uniform electric field is applied along y-axis, then its path in the x-y plane will be

A. A straight line

B. A circle

C. A parabola

D. An ellipse

Answer: C

Watch Video Solution

17. Cathode rays are similar to visible light rays in that

A. They both can be deflected by electric and magnetic fields

B. They both have a definite magnitude of wavelength

C. They both an ionise a gas through which they pass

D. They both can expose a photographic plate

Answer: D

Watch Video Solution

18. Gases begin to conduct electricity at low pressure because

A. Ar low pressure gases turn to plasma

B. Colliding electrons can acquire higher kinetic energy due to increased mean free path leading to ionisation of atoms

C. Atoms break up into electrons and protons

D. The electrons in atoms can move freely at low pressure

Answer: B

Watch Video Solution

19. A beam of electrons is moving with constant velocity in a region having simultaneous perpendicular electric and magnetic fields of strength $20Vm^{-1}$ and 0.5 T, respectively at right angles to the direction of motion of the electrons. Then, the velocity of electrons must be

A. $20ms^{-1}$

B. $40ms^{-1}$

C. $8ms^{-1}$

D. $5.5ms^{-1}$

Answer: B

Watch Video Solution

20. Kinetic energy of emited cathode rays is dependent on

A. Only voltage

B. Only work function

C. Both (a) and (b)

D. It does not depend upon any physical quantity

Answer: C

Watch Video Solution

21. The radius of the orbital of electron in the hydrogen atom 0.5 Å. The speed of the electron is $2 \times 10^6 m/s$. Then the current in the loop due to the motion of the electron is

A. 1 mA

B. 1.5 mA

C. 2.5 mA

D. $1.5 \times 10^{-2} mA$

Answer: A

Watch Video Solution

22. Kinetic energy of an electron accelerated in a potential difference of $100V$ is

A. $1.602 \times 10^{-17} J$

B. 418.6 calories

C. $1.16 \times 10^{4} K$

D. 6.626×10^{-34} W-sec

Answer: A

Watch Video Solution

23. When a proton is accelerated with 1 volt potential difference, then its kinetic energy is

A. $\frac{1}{1840} eV$

B. $1840 eV$

C. $1eV$

D. $1840ceV$

Answer: C

Watch Video Solution

24. Energy of electrons can be increased by allowing them

A. To fall through electric potential

B. To move in high magnetic field

C. To fall from great heights

D. To pass through lead blocks

Answer: A

Watch Video Solution

25. In a Millikan's oil drop experiment the charge on an oil drop is calculated to be $16.35 \times 10^{-19} C$. The number of excess electrons on the drop is

A. 3.9

B. 4

C. 4.2

D. 6

Answer: B

Watch Video Solution

26. Cathode rays are

A. Photons

B. Electrons

C. Protons

D. $\alpha -$ particles

Answer: B

Watch Video Solution

27. A metal plate gets heted, when cathode rays strike against it due to

A. Kinetic energy of cathode rays

B. Potential energy of cathode rays

C. Linear velocity of cathode rays

D. Angular velocity of cathode rays

Answer: A

Watch Video Solution

28. Cathode rays are

A. Positive rays

B. Neutral rays

C. He rays

D. Electron waves

Answer: D

Watch Video Solution

29. An electron of charge 'e' coulomb passes through a potential difference of V volts. Its energy in 'joules' will be

A. V/e

B. eV

C. e/V

D. V

Answer: B

Watch Video Solution

30. An electron is accelerated through a potential difference of 200 volts. If e/m for the electron be 1.6×10^{11} coulomb/kg, the velocity acquired by the electron will be

A. $8 \times 10^6 m / s$

B. $8 \times 10^5 m / s$

C. $5.9 \times 10^6 m / s$

D. $5.9 \times 10^5 m / s$

Answer: A

Watch Video Solution

31. Which is not true with respect to the cathode rays ?

A. A stream of electrons

B. Charged particles

C. Move with speed same as that of light

D. Can be deflected by magnetic fields

Answer: C

Watch Video Solution

32. In Millikan's experiment, an oil drop having charge q gets stationary on applying a potential difference V in between two plates separated by a distance 'd'. The weight of the drop is

A. qVd

B. $q\frac{d}{V}$

C. $\frac{q}{Vd}$

D. $q\frac{V}{d}$

Answer: D

Watch Video Solution

33. Electron volt is the unit of

A. Potential

B. Charge

C. Power

D. Energy

Answer: D

Watch Video Solution

34. In Thomson experiment of finding e/m for electrons, been of electron is replaced by that of muons (particle with same charges as of electrons but mass 208 times that of electrons). No deflection condition in this case satisfied if

A. B is increased 208 times

B. E is increased 208 times

C. B is increased 14.4 times

D. None of these

Answer: C

Watch Video Solution

35. The colour of the positive column ina gas discharge tube depends on

A. The type of glass used to construct the tube

B. The gas in the tube

C. The applied voltage

D. The material of the cathode

Answer: B

Watch Video Solution

36. The speed of an electron having a wavelength of $10^{-10}m$ is

A. $7.25 \times 10^6 m/s$

B. $6.26 \times 10^6 m/s$

C. $5.25 \times 10^6 m/s$

D. $4.24 \times 10^6 m/s$

Answer: A

Watch Video Solution

37. Which of the following is not the property of a cathode rays

A. It casts shadow

B. It produces heating effect

C. It prouces fluroscence

D. It does not deflect in electric field

Answer: D

Watch Video Solution

38. In a Thomson set-up for the demination of e/m, electrons accelerated by 2.5 kV enter the region of crossed electric and magnetic fields of strengths $3.6 \times 10^4 Vm^{-1}$ and $1.2 \times 10^{-3} T$ respectively and through undeflected. The meaured value of e/m of the electron is equal to

A. $1.0 \times 10^{11} C - kg^{-1}$

B. $1.76 \times 10^{11} C - kg^{-1}$

C. $1.80 \times 10^{11} C - kg^{-1}$

D. $1.85 \times 10^{11} C - kg^{-1}$

Answer: C

Watch Video Solution

39. The ratio of specific charge of an $\alpha -$ particle to that of a proton is

A. $2:1$

B. $1:1$

C. $1:2$

D. $1:3$

Answer: C

Watch Video Solution

40. In Bainbridge mass spectograph a potential difference of 1000 V is applied between two plates distant 1 cm apart and magnetic field in $B = 1T$. The velocity of unflected positive ions in m//s from the velocity selector is

A. $10^7 m/s$

B. $10^4 m/s$

C. $10^5 m/s$

D. $10^2 m/s$

Answer: C

Watch Video Solution

41. When cathode rays (tube voltage - 10 kV) collide with the anode of high atomic weight then we get

A. Positive rays

B. X-rays

C. Gamma rays

D. Canal rays

Answer: B

Watch Video Solution

42. In Thomson's experiment if the value of q/m is the same for all positive ions striking the photographic plate, then the trace would be

A. Straight line

B. Parabolic

C. Circular

D. Elliptical

Answer: B

Watch Video Solution

43. In a discharge tube at 0.02 mm, there is a formation of

A. FDS

B. CDS

C. Both space

D. None of these

Answer: B

Watch Video Solution

44. Electric field and magnetic field in Thomson mass spectrograph are applied

A. Simultaneously, perpendicular

B. Perpendicular but not simultaneously

C. Parallel but no simultaneously

D. Parallel simultaneously

Answer: D

Watch Video Solution

45. The current conduction in a discharged tube is due to

A. Electrons only

B. $+ve$ ions and electrons

C. $-ve$ ions and electrons

D. $+ve$ ions, $-ve$ ions and electrons

Answer: D

Watch Video Solution

46. In Milikan's oil drop experiment, a charged drop falls with terminal velocity V. If an electric field E is applied in vertically upward direction then it starts moving in upward direction with terminal velocity 2V. If magnitude of electric field is decreased to $\frac{E}{2}$, then terminal velocity will become

A. $\frac{V}{2}$

B. V

C. $\frac{3V}{2}$

D. 2V

Answer: C

Watch Video Solution

47. An electron is accelerated through a p.d of 25.5 volt. The velocity acquired by it is (in ms)

A. 4×10^6

B. 4×10^4

C. 10^6

D. Zero

Answer: A

Watch Video Solution

48. The cathode its 8×10^{14} electrons per second, when heated. When 400 V is applied to anode all the emitted electrons reach the anode. The charge on electron is $1.6 \times 10^{-19} C$. The maximum anode current is

A. $2.7 \mu A$

B. $128 \mu A$

C. $72 \mu A$

D. $29 \mu A$

Answer: B

Watch Video Solution

49. Order of q/m ratio of proton, α-particle and electron is

A. $e > p > \alpha$

B. $p > \alpha > e$

C. $e > \alpha > p$

D. None of these

Answer: A

Watch Video Solution

50. A charge of magnitude $3e$ and mass $2m$ is moving electric field $\overrightarrow{E}$. The acceleration imparted to the charge is

A. $2Ee/3m$

B. $3Ee/2m$

C. $2m/3Ee$

D. $3m/2Ee$

Answer: B

Watch Video Solution

51. An electron initially at rest, is accelerated through a potential difference of 200 volt, so that it acquires a velocity $8.4 \times 10^6 m/s$. The value of e/m of elctron

A. $2.76 \times 10^{12} C/kg$

B. $1.76 \times 10^{11} C/kg$

C. $0.76 \times 10^{12} C/kg$

D. None of these

Answer: B

Watch Video Solution

52. An α-particle is accelerated through a.p.d of 10^6 volt the $K.E.$ of particle will be

A. 8 MeV

B. 4 MeV

C. 2 MeV

D. 1 MeV

Answer: C

Watch Video Solution

53. Positive rays consist of

A. Electrons

B. Neutrons

C. Positive ions

D. Electro magnetic waves

Answer: C

Watch Video Solution

54. O^{++}, C^{+}, He^{++} and H^{+} inos are projected on the photographic plate with same velocity in a sepctrograph. Which one will strike farthest ?

A. O^{++}

B. C^{+}

C. He^{++}

D. H_2^+

Answer: B

Watch Video Solution

55. An electron beam is moving between two parallel plates having eletric field $1.125 \times 10^{-6} N/m$. A magnetic field $3 \times 10^{-10} T$ is also applied so that beam of electrons do not deflect. The velocity of the electron is

A. 4225 m/s

B. 3750 m/s

C. 2750 m/s

D. 3200 m/s

Answer: B

Watch Video Solution

56. Positive rays was discovered by

A. Thomson

B. Golstem

C. W. Crookes

D. Rutherford

Answer: A

Watch Video Solution

57. An electron is moving in electron field and magnetic field it will gain energy from

A. Electric field

B. Magnetic field

C. Both of these

D. None of these

Answer: A

Watch Video Solution

58. If an electron oscillates at a frequency of 1 GHz it gives

A. X-rays

B. Mirowaves

C. Infrared rays

D. None of these

Answer: D

Watch Video Solution

59. In an electron gun, the electrons are accelerated by the potential V. If the e is the charge and m is the mass of the electron, then the maximum velocity of these electrons will be

A. $\frac{2eV}{m}$

B. $\sqrt{\frac{2eV}{m}}$

C. $\sqrt{\frac{2m}{eV}}$

D. $\frac{V^2}{2em}$

Answer: B

Watch Video Solution

60. Which of the following have highest specific charge

A. Positron

B. Proton

C. He

D. None of these

Answer: A

Watch Video Solution

61. In Millikan's oil drop experiment, an oil drop mass $60 \times 10^{-6} kg$ is balanced by an electric field of $10^6 V/m$. The charge in coulomb on the drop, assuming $g = 10 m/s^2$ is

A. 6.2×10^{-11}

B. 16×10^{-9}

C. 16×10^{-11}

D. 16×10^{-13}

Answer: C

Watch Video Solution

62. The idea of matter waves was given by

A. Davisson and Germer

B. de-Broglie

C. Einstein

D. Plank

Answer: B

Watch Video Solution

63. A wave is associated with matter when it is

A. When it is stationary

B. When it is in motion with the velocity of light only

C. When it is in motion with any velocity

D. None of these

Answer: C

Watch Video Solution

64. The de - Broglie wavelength associated with the particle of mass m moving with velocity v is

A. h/mv

B. mv/h

C. mh/v

D. m/hv

Answer: A

Watch Video Solution

65. A photon , an electron and a uranium nucleus all have the same wavelength . The one with the most energy

A. Is th photon

B. Is the electron

C. Is the uranium nucleus

D. Depends upon the wavelength and the properties of the particle.

Answer: A

Watch Video Solution

66. A particle which has zero rest mass and non - zero energy and momentum must travel with a speed

A. Equal to c, the speed of the in vacuum

B. Greater than c

C. Less than c

D. Tending to infinity

Answer: A

Watch Video Solution

67. When the kinetic energy of an electron is increased , the wavelength of the associated wave will

A. Increases

B. Decrease

C. Wavelength doesnot depend on the kintic energy

D. None of the above

Answer: B

Watch Video Solution

68. If the de - Broglie wavelengths for a proton and for a α - particle are equal , then the ratio of their velocities will be

A. $4:1$

B. $2:1$

C. $1:2$

D. $1:4$

Answer: A

Watch Video Solution

69. The de - Broglie wavelength λ associated with an electron having kinetic energy E is given by the expression

A. $\frac{h}{\sqrt{2mE}}$

B. $\frac{2h}{mE}$

C. $2mhE$

D. $\frac{2\sqrt{2mE}}{h}$

Answer: A

Watch Video Solution

70. Dual nature of radiation is shown by

A. Diffraction and reflection

B. Refraction and diffraction

C. Photoelectron effect alone

D. Photoelectric effect and diffraction

Answer: D

Watch Video Solution

71. For the Bohr's first orbit of circumference $2\pi r$, the de - Broglie wavelength of revolving electron will be

A. $2\pi r$

B. πr

C. $\frac{1}{2\pi r}$

D. $\frac{1}{4\pi r}$

Answer: A

Watch Video Solution

72. An electron of mass 'm', when accelerated through a potential V has de-Broglie wavelength λ. The de-Broglie wavelength associated with a proton of mass M accelerated through the same potential difference will be:

A. $\lambda \frac{m}{M}$

B. $\lambda \sqrt{\frac{m}{M}}$

C. $\lambda \frac{M}{m}$

D. $\lambda \sqrt{\frac{M}{m}}$

Answer: B

Watch Video Solution

73. What will be the ratio of de - Broglie wavelengths of proton and α - particle of same energy ?

A. $2:1$

B. $1:2$

C. $4:1$

D. $1:4$

Answer: A

Watch Video Solution

74. What is the de - Broglie wavelength of the alpha - particle accelerated through a potential difference V?

A. $\frac{0.287}{\sqrt{V}}\text{Å}$

B. $\frac{12.27}{\sqrt{V}}\text{Å}$

C. $\frac{0.101}{\sqrt{V}}\text{Å}$

D. $\frac{0.202}{\sqrt{V}}\text{Å}$

Answer: C

Watch Video Solution

75. de-Broglie hypothesis treated electrons as

A. Particles

B. Waves

C. Both 'a' and 'b'

D. None of these

Answer: B

Watch Video Solution

76. The energy that should be added to an eletron, to reduce its de-Broglie wavelengths from $10^{-10}m$ to 0.5×10^{-10} m wil be

A. Four time the initial energy

B. Thrice the initial energy

C. Equal to the initial energy

D. Twice the initial energy

Answer: B

Watch Video Solution

77. The de-Broglie wavelength of an electron having 80 eV of energy is nearly

$(1eV = 1.6 \times 10J - \sec$ Plank's constant $= 6.6 \times 10J - \sec)$

A. 140 Å

B. 0.14 Å

C. 14 Å

D. 1.4 Å

Answer: D

Watch Video Solution

78. If particles are moving with same velocity , then maximum de - Broglie wavelength will be for

A. Neutron

B. Proton

C. $\beta -$ particle

D. $\alpha -$ particles

Answer: C

Watch Video Solution

79. If an electron and a photon propagate in the form of waves having the same wavelength , it implies that they have the same

A. Energy

B. Momentum

C. Velocity

D. Angular momentum

Answer: B

Watch Video Solution

80. The de-Broglie wavelength is proportional to

A. $\lambda \propto \frac{1}{V}$

B. $\lambda \propto \frac{1}{m}$

C. $\lambda \propto \frac{1}{p}$

D. $\lambda \propto p$

Answer: C

Watch Video Solution

81. Particle nature and wave nature of electromagnetic waves and electrons can be shown by

A. Electron has small mass, deflected by the metal sheet

B. X-ray is diffracted and defracted

C. Light is refracted and defracted

D. Photoelectricity and electron microscopy

Answer: D

Watch Video Solution

82. The de - Broglie wavelength of a particle moving with a velocity $2.25 \times 10^8 m/s$ is equal to the wavelength of photon. The ratio of kinetic energy of the particle to the energy of the photon is (velocity of light is $3 \times 10^8 m/s$

A. $1/8$

B. $3/8$

C. $5/8$

D. $7/8$

Answer: B

Watch Video Solution

83. According to de - Broglie , the de - Broglie wavelength for electron in an orbit of hydrogen atom is $10^{-9} m$. The principle quantum number for this electron is

A. 1

B. 2

C. 3

D. 4

Answer: C

Watch Video Solution

84. The speed of an electron having a wavelength of $10^{-10}m$ is

A. $7.25 \times 10^6 m/s$

B. $6.26 \times 10^6 m/s$

C. $5.25 \times 10^6 m/s$

D. $4.25 \times 10^6 m/s$

Answer: A

Watch Video Solution

85. The kinetic energy of electron and proton is $10^{-32} J$. Then the relation between their de - Broglie wavelength is

A. $\lambda_p < \lambda_e$

B. $\lambda_p > \lambda_e$

C. $\lambda_p = \lambda_e$

D. $\lambda_p = 2\lambda_e$

Answer: A

Watch Video Solution

86. The de - Broglie wavelength of a particle accelerated with $150vo <$ "potential is" $10^{-10}m.$ If it is accelerated by $600vo < sp. d.$, its wavelength will be

A. 0.25 Å

B. 0.5 Å

C. 1.5 Å

D. 2 Å

Answer: B

Watch Video Solution

87. The de - Broglie wavelength associated with a hydrogen molecule moving with a thermal velocity of $3km / s$ will be

A. 1 Å

B. 0.66 Å

C. 6.6 Å

D. 66 Å

Answer: B

Watch Video Solution

88. When the mkomentum of a proton is changed by an amount p_0, the corresponding change in the de-Broglie wavelength is found to be $0.25\,\%$. Then, the original momentum of the proton was

A. p

B. 100 p

C. 400 p

D. $4p$

Answer: C

Watch Video Solution

89. The de - Broglie wavelength of a neutron at $27^\circ C$ is λ. What will be its wavelength at $927^\circ C$?

A. $\lambda / 2$

B. $\lambda / 3$

C. $\lambda / 4$

D. $\lambda / 9$

Answer: A

Watch Video Solution

Watch Video Solution

90. An electron and proton have the same de-Broglie wavelength. Then the kinetic energy of the electron is

A. Zero

B. Infinity

C. Equal to the kinetic energy of the proton

D. Greater than the kinetic energy of the proton

Answer: D

Watch Video Solution

91. For moving ball of cricket, the correct statement about de-Broglie wavelength is

A. It is not applicable for such big particle

B. $\dfrac{h}{\sqrt{2mE}}$

C. $\sqrt{\dfrac{h}{2mE}}$

D. $\dfrac{h}{2mE}$

Answer: B

Watch Video Solution

92. Photon and electron are given same energy $(10^{-20}J)$. Wavelength associated with photon and electron are λ_{ph} and λ_{el} then correct statement will be

A. $\lambda_{Ph} > \lambda_{el}$

B. $\lambda_{Ph} < \lambda_{el}$

C. $\lambda_{Ph} = \lambda_{el}$

D. $\frac{\lambda_{el}}{\lambda_{Ph}} = C$

Answer: A

Watch Video Solution

93. The kinetic energy of an electron with de - Broglie wavelength of $0.3 nanometre$ is

A. 0.168 eV

B. 16.8 eV

C. 1.68 eV

D. 2.5 eV

Answer: B

Watch Video Solution

94. A proton and and α- particle are accelerated through a potential difference of $100V$. The ratio of the wavelength with the proton to that associated to that associated with an α - particle is

A. $\sqrt{2}:1$

B. $2:1$

C. $2\sqrt{2}:1$

D. $\frac{1}{2\sqrt{2}}:1$

Answer: C

Watch Video Solution

95. The wavelength of de - Broglie wave is $2\mu m$, then its momentum is $(h = 6.63 \times 10^{-34J-s}$

A. 3.315×10 kg-m/s

B. 1.66×10^{-28} kg-m/s

C. 4.97×10 kg-m/s

D. 9.9×10 kg-m/s

Answer: A

Watch Video Solution

96. de - Broglie wavelength of a body of mass $1kg$ moving with velocity of $2000m/s$ is

A. $3.32 \times 10\text{Å}$

B. $1.5 \times 10\text{Å}$

C. $0.55 \times 10\text{Å}$

D. None of these

Answer: A

Watch Video Solution

97. The kinetic energy of an electron is $5eV$. Calculate the de - Broglie wavelength associated with it $\left(h = 6.6 \times 10^{-34} Js, m_e = 9.1 \times 10^{-31} kg\right)$

A. 5.47 Å

B. 10.9 Å

C. 2.7 Å

D. None of these

Answer: A

Watch Video Solution

98. The wavelength associated with an electron accelerated through a potential difference of $100V$ is nearly

A. 100 Å

B. 123 Å

C. 1.23 Å

D. 0.123 Å

Answer: C

Watch Video Solution

99. The de-Broglie wavelength λ

A. is proportional to mass

B. is proportional to impulse

C. Inversely proportional to impulse

D. does not depend on impulse

Answer: C

Watch Video Solution

100. Davisson and Germer experiment proved

A. Wave nature of light

B. particle nature of light

C. Both (a) and (b)

D. Neither (a) nor (b)

Answer: D

Watch Video Solution

101. If the kinetic energy of a free electron doubles , its de - Broglie wavelength changes by the factor

A. $\frac{1}{\sqrt{2}}$

B. $\sqrt{2}$

C. $\frac{1}{2}$

D. 2

Answer: A

Watch Video Solution

102. The energy that should be added to an electron to reduce its de - Broglie wavelength from one $nm \rightarrow 0.5nm$ is

A. Four times the initial energy

B. Equal to the initial energy

C. Twice the intial energy

D. Thrice the intial energy

Answer: D

Watch Video Solution

103. The de - Broglie wavelength λ associated with an electron having kinetic energy E is given by the expression

A. $\lambda = \frac{h}{mE}$

B. $\lambda = \frac{\sqrt{2mE}}{h}$

C. $\lambda = \frac{h}{2mE}$

D. $\lambda = \frac{h}{\sqrt{2mE}}$

Answer: D

Watch Video Solution

104. The wavelength of the matter wave is independent of

A. Mass

B. Velocity

C. Momentum

D. Charge

Answer: D

Watch Video Solution

105. The momentum of a photon is $33 \times 10^{-29} kg - m/\sec$. Its frequency will be

A. $3 \times 10^3 Hz$

B. $6 \times 10^3 Hz$

C. $7.5 \times 10^{12} Hz$

D. $1.5 \times 10^{13} Hz$

Answer: D

Watch Video Solution

106. The energy of a photon of wavelength λ is given by

A. $h\lambda$

B. $ch\lambda$

C. λ / hc

D. hc / λ

Answer: D

Watch Video Solution

107. The momentum of a photon is $2 \times 10^{-16} gm - cm / \sec$. Its energy is

A. 0.61×10^{-26} erg

B. 2.0×10^{-26} erg

C. 6×10^{-6} erg

D. 6×10^{-8} erg

Answer: C

Watch Video Solution

Watch Video Solution

108. The rest mass of the photon is

A. 0

B. ∞

C. Between 0 and ∞

D. Equal to that of an electron

Answer: A

Watch Video Solution

109. The momentum of the photon of wavelength 5000Å will be

A. $1.3 \times 10^{-27} kg - m / \sec$

B. $1.3 \times 10^{-28} kg - m / \sec$

C. $4 \times 10^{29} kg - m / \sec$

D. $4 \times 10^{-18} kg - m / \sec$

Answer: A

Watch Video Solution

110. A photon in motion has a mass

A. c / hv

B. h / v

C. hv

D. hv / c^2

Answer: D

Watch Video Solution

111. If the momentum of a photon is p, then its frequency is

A. $\frac{ph}{c}$

B. $\frac{pc}{h}$

C. $\frac{mh}{c}$

D. $\frac{mc}{h}$

Answer: B

Watch Video Solution

112. An AIR station is broadcasting the waves of wavelength $300 metres$. If the radiating power of the transmitter is $10kW$, then the number of photons radiated per second is

A. 1.5×10^{29}

B. 1.5×10^{31}

C. 1.5×10^{33}

D. 1.5×10^{35}

Answer: B

Watch Video Solution

113. The energy of a photon is $E = hv$ and the momentum of photon $p = \frac{h}{\lambda}$, then the velocity of photon will be

A. E/p

B. Ep

C. $\left(\frac{E}{p}\right)^2$

D. $3 \times 10^8 m/s$

Answer: A

Watch Video Solution

114. The approximate wavelength of a photon of energy $2.48 eV$ is

A. 500 Å

B. 5000 Å

C. 2000 Å

D. 1000 Å

Answer: B

Watch Video Solution

115. An important spetral emission line has a wavelength of 21 cm.

The corresponding photon energy is

$(h = 6.62 \times 10^{-34} Js, c = 3 \times 10^8 m/s)$

A. $5.9 \times 10^4 eV$

B. $5.9 \times 10^{-6} eV$

C. $5.9 \times 10^{-8} eV$

D. $11.8 \times 10^{-6} eV$

Answer: B

Watch Video Solution

116. The momentum of a photon in an X - ray beam of $10^{-10} metre$ wavelength is

A. $1.5 \times 10^{-23} kg - m / \sec$

B. $6.6 \times 10^{-24} kg - m / \sec$

C. $6.6 \times 10^{-44} kg - m / \sec$

D. $2.2 \times 10^{-52} kg - m / \sec$

Answer: B

Watch Video Solution

117. The energy of a photon of light with wavelength 5000Å is approximately $2.5eV$. This way the energy of an X - ray photon with wavelength 1Å would be

A. 2.5/5000 eV

B. $2.5 / (5000)^2 eV$

C. $2.5 \times 5000eV$

D. $2.5 \times (5000)^2 eV$

Answer: C

Watch Video Solution

118. Energy of an quanta of frequency $10^{15} Hz$ and $h = 6.6 \times 10^{-34} J - \sec$ will be

A. $6.6 \times 10^{-19} J$

B. $6.6 \times 10^{-12} J$

C. $6.6 \times 10^{-49} J$

D. $6.6 \times 10^{-41} J$

Answer: A

Watch Video Solution

119. Momentum of a photon of wavelength λ is

A. $\frac{h}{\lambda}$

B. Zero

C. $\frac{h\lambda}{c^2}$

D. $\frac{h\lambda}{c}$

Answer: A

Watch Video Solution

120. Wavelength of a $1keV$ photon is $1.24 \times 10^{-9}m$. What is the frequency of $1MeV$ photon ?

A. $1.24 \times 10^{15}Hz$

B. $2.4 \times 10^{20}Hz$

C. $1.24 \times 10^{18} Hz$

D. $2.4 \times 10^{23} Hz$

Answer: B

Watch Video Solution

121. What is the momentum of a photon having frequency $1.5 \times 10^{13} Hz$?

A. $3.3 \times 10^{-29} kgm/s$

B. $3.3 \times 10^{-34} kgm/s$

C. $6.6 \times 10^{-34} kgm/s$

D. $6.6 \times 10^{-30} kgm/s$

Answer: A

Watch Video Solution

Watch Video Solution

122. Frequency of photon having energy 66 eV is

A. $8 \times 10^{-15} Hz$

B. $12 \times 10^{-15} Hz$

C. $16 \times 10^{15} Hz$

D. None of these

Answer: C

Watch Video Solution

123. Which of the following statement is not correct

A. Photographic plates are sensitive to infrared rays

B. Photographic plates are sensitive to ultraviolet rays

C. Infra-red rays are invisible but can cast shadows like visible light

D. Infrared photons have more energy than photons of visible light

Answer: D

Watch Video Solution

124. If we express the energy of a photon in KeV and the wavelength in angstroms , then energy of a photon can be calculated from the relation

A. $E = 12.4hv$

B. $E = 12.4h / \lambda$

C. $E = 12.4 / \lambda$

D. $E = hv$

Answer: C

Watch Video Solution

125. The frequency of a photon , having energy $100eVis\left(h = 6.610^{-34}J - \sec\right)$

A. $2.43 \times 10^{26}Hz$

B. $2.42 \times 10^{16}Hz$

C. $2.42 \times 10^{12}Hz$

D. $2.42 \times 10^{9}Hz$

Answer: B

Watch Video Solution

126. A photon of wavelength 4400Å is passing through vaccum. The effective mass and momentum of the photon are respectively

A. $5 \times 19^{-36} kg, 1.5 \times 10^{-27} kg - m/s$

B. $5 \times 10^{-35} kg, 1.5 \times 10^{-26} kg - m/s$

C. Zero,$1.5 \times 10^{-29} kg - m/s$

D. $5 \times 10^{-36} kg, 1.67 \times 10^{-43} kg - m/s$

Answer: A

Watch Video Solution

127. Which of the following is incorrect statement regarding photon

A. Photon exerts no pressure

B. Photon enery is hv

C. Photon rest mass is zero

D. None of these

Answer: A

Watch Video Solution

128. If a photon has velocity c and frequency n , then which of following represents its wavelength ?

A. $\frac{hc}{E}$

B. $\frac{hv}{c}$

C. $\frac{hv}{c^2}$

D. hv

Answer: A

Watch Video Solution

129. The mass of a photo electron is

A. $9.1 \times 10^{-27} kg$

B. $9.1 \times 10^{-29} kg$

C. 9.1×10^{-31} kg

D. $9.1 \times 10^{-34} kg$

Answer: C

Watch Video Solution

130. Energy of photon whose frequency is $10^{12} MHz$, will be

A. $4.14 \times 10^3 keV$

B. $4.14 \times 10^2 eV$

C. $4.14 \times 10^3 MeV$

D. $4.14 \times 10^3 eV$

Answer: D

Watch Video Solution

131. There are n_1 photons of frequency γ_1 in a beam of light . In an equally energentic beam , there are n_2 photons of frequency γ_2. Then the correct relation is

A. $\frac{n_1}{n_2} = 1$

B. $\frac{n_1}{n_2} = \frac{\gamma_1}{\gamma_2}$

C. $\frac{n_1}{n_2} = \frac{\gamma_2}{\gamma_1}$

D. $\frac{n_1}{n_2} = \frac{\gamma_1^2}{\gamma_2^2}$

Answer: C

Watch Video Solution

132. Einstein's photoelectric equation states that $E_k = hv - W$, In this equation E_k refers to :

A. Kinetic energy of all the emitted electrons

B. Mean kinetic energy of the emitted electrons

C. Maximum kinetic energy of the emitted electrons

D. Minimum kinetic energy of the emitted electrons

Answer: C

Watch Video Solution

133. Kinetic energy with which the electrons are emitted from the metal surface due to photoelectric effect is

A. Independent of the intensity of illumination

B. Independent of the frequency of light

C. Inversely proportional to the intensity of illumination

D. Directly proportional to the intensity of illumination

Answer: A

Watch Video Solution

134. The threshold wavelength for photoelectric emission for a material is $5200 A^{\circ}$. Will the photoelectrons be emitted when this material is illuminated with monochromatic radiation from 1 watt ultra violet lamp?

A. 50 watt infrared lamp

B. Both (c) and (d)

C. 50 watt ultraviolet lamp

D. 1 watt untraviolet lamp

Answer: D

Watch Video Solution

135. Threshold frequency for a metal is $10^{15} Hz$. Light of $\lambda = 4000 \text{Å}$ falls on its surface . Which of the following statements is correct ?

A. No photoelectric emission takes place

B. Photo-electrons come out with zero speed

C. Photo-electrons come out with 103 m/sec speed

D. Photo-electrons come out with 105 m/sec speed

Answer: A

Watch Video Solution

136. Photo cells are used for the

A. Reproduction of pictures from the cinema film

B. Reproduction of sound from the cinema film

C. Automatic switching of street light

D. (b) and (c) both

Answer: D

Watch Video Solution

137. Einstein got Nobel prize on which of the following works

A. Mass-energy relation

B. Special theory of relativity

C. Photoelectric equation

D. (a) and (b) both

Answer: C

Watch Video Solution

138. The photo-electrons emitted from a surface of sodium metal are such that

A. They all are of the same frequency

B. They have the same kinetic energy

C. They have the same de Broglie wavelength

D. They have their speeds varying from zero to a certain maximum

Answer: D

Watch Video Solution

139. A metal surface of work function $1.07eV$ is irradiated with light of wavelength $332nm$. The retarding potential required to stop the escape of photo - electrons is

A. 4.81 eV

B. 3.74 eV

C. 2.66 eV

D. 1.07 eV

Answer: C

Watch Video Solution

140. When light falls on a metal surface , the maximum kinetic energy of the emitted photo - electrons depends upon

A. The time for which light falls on the metal

B. Frequency of the incident light

C. Intensity of the incident light

D. Velocity of the incident light

Answer: B

Watch Video Solution

141. The electrons are emitted in the photoelectricm effect from a metal surface

A. Only if the frequency of the incident radiation is above a certain threshold value

B. Only if the temperature of the surface is high

C. At a rate that is independent of the nature of the metal

D. With a maximum velocity proportional to the frequency of the incident radiation

Answer: A

Watch Video Solution

142. The work function of a metal is $4.2eV$, its threshold wavelength will be

A. 4000 Å

B. 3500 Å

C. 2955 Å

D. 2500 Å

Answer: C

Watch Video Solution

143. The number of photo - electrons emitted per second from a metal surface increases when

A. The energy of incident photons increases

B. The frequency of incident light increases

C. The wavelength of the incident light increases

D. The intensity of the incident light increases

Answer: D

Watch Video Solution

Watch Video Solution

144. The work function of metal is $1eV$. Light of wavelength 3000Å is incident on this metal surface . The velocity of emitted photo - electrons will be

A. 10 m/sec

B. $1 \times 10^3 m / \sec$

C. $1 \times 10^4 m / \sec$

D. $1 \times 10^6 m / \sec$

Answer: D

Watch Video Solution

145. The retarding potential for having zero photo - electron current

A. Is proportional to the wavelength of incident light

B. Increases uniformly with the increase in the wavelength of incident light

C. Is proportional to the frequency of incident light

D. Increases uniformly with the increase in the frequency of incident light wave

Answer: D

Watch Video Solution

146. In a dark room of photography, generally red light is used. The reason is

A. Most of the photographic films are not sensitive to red light

B. The frequency for red light is low and hence the energy hvof photons is less

C. (a) and (b) both

D. None of the above

Answer: C

Watch Video Solution

147. The work function of a metal is $1.6 \times 10^{-19} J$. When the metal surface is illuminated by the light of wavelength $6400 Å$, then the maximum kinetic energy of emitted photo - electrons will be

(Planck's constant $h = 6.4 \times 10^{-34} Js$)

A. $14 \times 10^{-19} J$

B. $2.8 \times 10^{-19} J$

C. $1.4 \times 10^{-19} J$

D. $1.4 \times 10^{-19} eV$

Answer: C

Watch Video Solution

148. Ultraviolet radiation of 6.2 eV falls on an aluminium surface (work - function = 4.2 eV). The kinetic energy in joule of the fastest electrons emitted is

A. 3.2×10^{-21}

B. 3.2×10^{-19}

C. 3.2×10^{-17}

D. 3.2×10^{-15}

Answer: B

Watch Video Solution

149. The work function for tungsten and sodium are $4.5eV$ and $2.3eV$ respectively . If the threshold wavelength λ for sodium is 5460Å, the value of λ for tungsten is

A. 5893 Å

B. 10683 Å

C. 2791 Å

D. 528 Å

Answer: C

Watch Video Solution

150. A photon energy $3.4 eV$ is incident on a metal having work function $2 eV$. The maximum $K.E.$ of photoelectrons is equal to

A. 1.4 eV

B. 1.7 eV

C. 5.4 eV

D. 6.8 eV

Answer: A

Watch Video Solution

151. The work function of a metallic surface is $5.01 eV$. The photo - electrons are emitted when light of wavelength 2000Å falls on it . The potential difference applied to stop the fastest photo - electrons is $\left[h = 4.14 \times 10^{-15} eV \text{ sec}\right]$

A. 1.2 volts

B. 2.24 volts

C. 3.6 volts

D. 4.8 volts

Answer: A

Watch Video Solution

152. The photoelectric threshould wavelength for a metal surface is 6600 Å. The work function for this is

A. 1.87 V

B. 1.87 eV

C. 18.7 eV

D. 0.18 eV

Answer: B

Watch Video Solution

153. Photoelectric effect was successfully explained first by

A. Planck

B. Hallwash

C. Hertz

D. Einstein

Answer: D

Watch Video Solution

154. The spectrum of radiation $1.0 \times 10^{14} Hz$ is the infrared region. The energy of one photon of this in joules will be

A. 6.62×10^{-48}

B. 6.62×10^{-20}

C. $\frac{6.62}{3} \times 10^{-28}$

D. $3 \times 6.62 \times 10^{-28}$

Answer: B

Watch Video Solution

155. A radio transmitter operates at a frequency of $880 kHz$ and a power of $10 kW$. The number of photons emitted per second are

A. 1.72×10^{31}

B. 1327×10^{34}

C. 13.27×10^{34}

D. 0.075×10^{-34}

Answer: A

Watch Video Solution

156. A photo cell is receiving light from a source placed at a distance of $1m$. If the same source is to be placed at a distance of $2m$, then the ejected electron

A. Moves with one-fourth energy as that of the initial energy

B. Moves with one-fourth of momentum as that of the initial momentum

C. Will be half in number

D. Will be one-fourth in number

Answer: D

Watch Video Solution

157. In a photoelectric experiment for 4000 Å incident radiation, the potential difference to stop the ejection is 2 V . If the incident light is changed to 3000 Å , then the potential required to stop the ejection of electrons will be

A. 2 V

B. Less than 2 V

C. Zero

D. Greater than 2 V

Answer: D

Watch Video Solution

158. If the threshold wavelength for sodium is 5420Å, then the work function of sodium is

A. 4.58 eV

B. 2.29 eV

C. 1.14 eV

D. 0.57 eV

Answer: B

Watch Video Solution

159. Photo cell is a device to

A. Store photons

B. Measure light intensity

C. Convert photon energy into mechanical energy

D. Store electrical energy for replacing storage batteries

Answer: B

Watch Video Solution

160. If the work function for a certain metal is 3.2×10^{-19} joule and it is illuminated with light of frequency $8 \times 10^{14} Hz$. The maximum kinetic energy of the photo-electrons would be

$\left(h = 6.63 \times 10^{-34} Js\right)$

A. $2.1 \times 10^{-19} J$

B. $8.5 \times 10^{-9} J$

C. $5.3 \times 10^{-19} J$

D. $3.2 \times 10^{-19} J$

Answer: A

Watch Video Solution

161. Stopping potential for photoelectrons

A. Does not depend on the frequency of the incident light

B. Does not depend upon the nature of the cathode material

C. Depends on both the frequency of the incident light and nature of the cathode material

D. Depends upon the intensity of the incident light

Answer: C

Watch Video Solution

162. The maximum wavelength of radiation that can produce photoelectric effect in a certain metal is 200 nm . The maximum kinetic energy acquired by electron due to radiation of wavelength 100 nm will be

A. 12.4 eV

B. 6.2 eV

C. 100 eV

D. 200 eV

Answer: B

Watch Video Solution

163. When the light source is kept 20 cm away from a photo cell, stopping potential 0.6 V is obtained. When source is kept 40 cm away, the stopping potential will be

A. 0.3 V

B. 0.6 V

C. 1.2 V

D. 2.4 V

Answer: B

Watch Video Solution

164. The minimum energy required to remove an electron is called

A. Stoping potential

B. Kinetic energy

C. Work function

D. None of these

Answer: C

Watch Video Solution

165. Light of wavelength 4000Å falls on a photosensitive metal and a negative $2V$ potential stops the emitted electrons. The work function of the material (in eV) is approximately $\left(h = 6.6 \times 10^{-34} Js, e = 1.6 \times 10^{-19} C, c = 3 \times 10^{8} ms^{-1}\right)$

A. 1.1

B. 2.0

C. 2.2

D. 3.1

Answer: A

Watch Video Solution

166. Assuming photoemission to take place , the factor by which the maximum velocity of the emitted photoelectrons changes when the wavelength of the incident radiation is increased four times , is

A. 4

B. $\frac{1}{4}$

C. 2

D. $\frac{1}{2}$

Answer: D

Watch Video Solution

167. Work funciton of a metal is 2.51eV. It threshold frequency is

A. 5.9×10^{14} cycle/sec

B. 6.5×10^{14} cycle/sec

C. 9.4×10^{14} cycle/sec

D. 6.08×10^{14} cycle/sec

Answer: D

Watch Video Solution

168. Energy conversion in a photoelectric cell takes place from

A. Chemical to electrical

B. Magnetic to electrical

C. Optical to electrical

D. Mechanical to electrical

Answer: C

Watch Video Solution

169. Which one of the following is true in photoelectric emission

A. Photoelectric current is directly proportional to the amplitude of light of a given frequency

B. Photoelectric current is directly proportional to the intensity of light of a given frequency at moderate intensities

C. Above the threshold frequency, the maximum K.E. of photoelectrons is inversely proportional to the frequency of incident light

D. The threshold frequency depends upon the wavelength of incident light

Answer: B

Watch Video Solution

170. When a point source of light is at a distance of one metre from a photo cell , the cut off voltage is found to be V. If the same source is placed at $2m$ distance from photo cell , the cut off voltage will be

A. V

B. V/2

C. V/4

D. $V / \sqrt{2}$

Answer: A

Watch Video Solution

171. The work function of a photoelectric material is 3.3 eV. The thershold frequency will be equal to

A. $8 \times 10^{4} Hz$

B. $8 \times 10^{56} Hz$

C. $8 \times 10^{10} Hz$

D. $8 \times 10^{14} Hz$

Answer: D

Watch Video Solution

172. If the work function of a metal is $'\phi'$ and the frequency of the incident light is $'v'$, there is no emission of photoelectron if

A. $v < \frac{\phi}{h}$

B. $v = \frac{\phi}{h}$

C. $v > \frac{\phi}{h}$

D. $v > \; = \; < \frac{\phi}{h}$

Answer: A

Watch Video Solution

173. A photoelectric cell is illuminated by a point source of light $1m$ away . When the source is shifted to $2m$ then

A. Number of electrons emitted is half the initial number

B. Each emitted electron carries half the initial energy

C. Number of electrons emitted is a quarter of the initial number

D. Each emitted electron carries one quarter of the initial energy

Answer: C

Watch Video Solution

174. Light of wavelength λ strikes a photo - sensitive surface and electrons are ejected with kinetic energy is to be increased to $2E$, the wavelength must be changed to λ' where

A. $\lambda' = \frac{\lambda}{2}$

B. $\lambda' = 2\lambda$

C. $\frac{\lambda}{2} < \lambda' < \lambda$

D. $\lambda' > \lambda$

Answer: C

Watch Video Solution

175. If in a photoelectric experiment , the wavelength of incident radiation is reduced from $6000Å \rightarrow 4000Å$ then

A. Stopping potential will decrease

B. Stopping potential will increase

C. Kinetic energy of emitted electrons will decrease

D. The value of work function will decrease

Answer: B

Watch Video Solution

176. The photoelectric work function for a metal surface is $4.125eV$. The cut - off wavelength for this surface is

A. 4125 Å

B. 2062.5 Å

C. 3000 Å

D. 6000 Å

Answer: C

Watch Video Solution

177. As the intensity of incident light increases

A. Photoelectric current increases

B. Photoelectric current decreases

C. Kinetic energy of emitted photoelectrons increases

D. Kinetic energy of emitted photoelectrons decreases

Answer: A

Watch Video Solution

178. Light of wavelength 5000Å falls on a sensitive plate with photoelectric work function of $1.9eV$. The kinetic energy of the photoelectron emitted will be

A. 0.58 eV

B. 2.48 eV

C. 1.24 eV

D. 1.16 eV

Answer: A

Watch Video Solution

179. Which of the following is dependent on the intensity of incident radiation in a photoelectric experiment

A. Work function of the surface

B. Amount of photoelectric curren

C. Stopping potential will be reduced

D. Maximum kinetic energy of photoelectrons

Answer: B

Watch Video Solution

180. The work function of a substance is $4.0 eV$ The longest wavelength of light that can cause photoelectron emission from this substance is approximately

A. 540 nm

B. 400 nm

C. 310 nm

D. 220 nm

Answer: C

Watch Video Solution

181. The maximum kinetic energy of photoelectrons emitted from a surface when photons of energy $6eV$ fall on it is $4eV$. The stopping potential , in volt is

A. 2

B. 4

C. 6

D. 10

Answer: B

Watch Video Solution

182. Work function of a metal is $2.1eV$. Which of the waves of the following wavelengths will be able to emit photoelectrons from its surface ?

A. 4000 Å,7500 Å

B. 5500 Å,6000 Å

C. 4000 Å,6000 Å

D. None of these

Answer: D

Watch Video Solution

183. If mean wavelength of light radiated by $100W$ lamp is 5000Å , then number of photons radiated per second are

A. 3×10^{23}

B. 2.5×10^{22}

C. 2.5×10^{20}

D. 5×10^{17}

Answer: C

Watch Video Solution

184. The frequency of incident light falling on a photosensitive metal plate is doubled, the K.E of the emitted photo-electrons is

A. Double the earlier value

B. Unchanged

C. More than doubled

D. Less than doubled

Answer: C

Watch Video Solution

185. When light of wavelength $300nm$ (nanometre) falls on a photoelectric emitter , however light of $600nm$ wavelength is sufficient for creating photoemission . What is the ratio of the work functions of the two emitters ?

A. $1:2$

B. $2:1$

C. $4:1$

D. $1:4$

Answer: B

Watch Video Solution

186. Threshold wavelength for photoelectric effect on sodium is 5000Å . Its work function is

A. $15J$

B. $16 \times 10^{-14} J$

C. $4 \times 10^{-19} J$

D. $4 \times 10^{-81} J$

Answer: C

Watch Video Solution

187. The cathode of a photoelectric cell is changed such that the work function changes from $(W_1 \rightarrow W_2 (W_2 > W_1)$. If the current before and after change are I_1 and I_2, all other conditions remaining unchanged , then (assuming $hv > W_2$)

A. $I_1 = I_2$

B. $I_1 < I_2$

C. $I_1 > I_2$

D. $I_1 < I_2 < 2I_1$

Answer: A

Watch Video Solution

188. A beam of light of wavelength λ and with illumination L falls on a clean surface of sodium . If N photoelectrons are emitted each with kinetic energy E, then

A. $N \propto L \text{ and } E \propto L$

B. $N \propto L \text{ and } E \propto \frac{1}{\lambda}$

C. $N \propto \lambda \text{ and } E \propto L$

D. $N \propto \frac{1}{\lambda} \text{ and } E \propto \frac{1}{L}$

Answer: B

Watch Video Solution

189. Which of the following statements is correct ?

A. The current in a photocell increases with increasing frequency of light

B. The photocurrent is proportional to applied voltage

C. The photocurrent increases with increasing intensity of light

D. The stopping potential increases with increasing intensity of incident light

Answer: C

Watch Video Solution

190. What is the stopping potential when the metal with work function $0.6 eV$ is illuminated with the light of $2 eV$?

A. 2.6 V

B. 3.6 V

C. 0.8 V

D. 1.4 V

Answer: D

Watch Video Solution

191. When yellow light is incident on a surface , no electrons are emitted while green light can emit. If red light is incident on the surface , then

A. No electrons are emitted

B. Photons are emitted

C. Electrons of higher energy are emitted

D. Electrons of lower energy are emitted

Answer: A

Watch Video Solution

192. The photoelectric threshold of a certain metal is $3000A$. If the radiation of $2000A$ is incident on the metal

A. Electrons will be emitted

B. Positrons will be emitted

C. Protons will be emitted

D. Electrons will not be emitted

Answer: A

Watch Video Solution

193. A photocell stoops emission if it is maintained at $2V$ negative potential . The energy of most energetic photoelectron is

A. 2 eV

B. 2 J

C. 2 kJ

D. 2 keV

Answer: A

Watch Video Solution

194. The work functions for sodium and copper are $2eV$ and $4eV$. Which of them is suitable for a photocell with 4000Å light ?

A. Copper

B. Sodium

C. Both

D. Neither of them

Answer: B

Watch Video Solution

195. For intensity I of a light of wavelength 5000Å the photoelectron saturation current is $0.40\mu A$ and stopping potential is $1.36V$, the work function of metal is

A. 2.47 eV

B. 1.36 eV

C. 1.10 eV

D. 0.43 eV

Answer: C

Watch Video Solution

196. The work function of aluminium is $4.2eV$. If two photons , each of energy $3.5eV$ strike an electron of aluminium , then emission of electrons will be

A. Possible

B. Not possible

C. Data is incomplete

D. Depend upon the density of the surface

Answer: B

Watch Video Solution

197. In photoelectric effect if the intensity of light is doubled then maximum kinetic energy of photoelectrons will become

A. Double

B. Half

C. Four time

D. No change

Answer: D

Watch Video Solution

198. Energy required to remove an electron from aluminium surface is 4.3 V. If light of wavelength 2000 Å falls on the surface, the velocity of the fastest electron ejected from the surface will be

A. $8.4 \times 10^5 m / \sec$

B. $7.4 \times 10^5 m / \sec$

C. $6.4 \times 10^5 m / \sec$

D. $8.4 \times 10^6 m / \sec$

Answer: A

Watch Video Solution

199. Mercury violet $(\lambda = 4558 \text{Å})$ is falling on a photosensitive material $(\phi = 2.5 eV)$. The speed of the ejected electrons is in

ms^{-1}, about

A. 3×10^5

B. 2.65×10^5

C. 4×10^4

D. 3.65×10^7

Answer: B

Watch Video Solution

200. The work functions of metals A and B are in the ratio $1:2$. If light of frequencies f and $2f$ are incident on the surfaces of A and B respectively , the ratio of the maximum kinetic energy of photoelectrons emitted is (f is greater than threshold frequency of A, $2f$ is greater than threshold frequency of B)

A. $1:1$

B. $1:2$

C. $1:3$

D. $1:4$

Answer: B

Watch Video Solution

201. Light of frequency v is incident on a substance of threshold frequency $v(v < v)$. The energy of the emitted photo-electron will be

A. $h(v - v_0)$

B. h/v

C. $he(v - v_0)$

D. h / v_0

Answer: A

Watch Video Solution

202. The stopping potential (V_0)

A. Depends upon the angle of incident light

B. Depends upon the intensity of incident light

C. Depends upon the surface nature of the substance

D. Is independent of the intensity of the incident light

Answer: D

Watch Video Solution

203. The work function of a metal is $4.2eV$, its threshold wavelength will be

A. 4125 Å

B. 4000 Å

C. 4500 Å

D. 5000 Å

Answer: A

Watch Video Solution

204. When wavelength of incident photon is decreased then

A. Velocity of emitted photo-electron decreases

B. Velocity of emitted photoelectron increases

C. Velocity of photoelectron do not charge

D. Photo electric current increases

Answer: B

Watch Video Solution

205. Quantam nature of light is explained by which of the following phenomenon

A. Huygen wave theory

B. Photoelectric effect

C. Maxwell electromagnetic theory

D. de-Broglie theory

Answer: B

Watch Video Solution

206. When a metal surface is illuminated by light wavelengths $400nm$ and $250nm$, the maximum velocities of the photoelectrons ejected are v and $2v$ respectively. The work function of the metal is

$(h = \text{Planck's constant}, c = \text{velocity of light in air})$

A. $2hc \times 10^6 J$

B. $1.5hc \times 10^6 J$

C. $hc \times 10^6 J$

D. $0.5hc \times 10^6 J$

Answer: A

Watch Video Solution

207. A photon of energy $4eV$ is incident on a metal surface whose work function is $2eV$. The minimum reverse potential to be applied for stopping the emission of electrons is

A. 2 V

B. 4 V

C. 6 V

D. $2\sqrt{2}V$

Answer: A

Watch Video Solution

208. Light of frequency v is incident on a certain photoelectric substance with threshold frequency v. The work function for the substance is

A. hv

B. hv0

C. $h(v - v_0)$

D. $h(v + v_0)$

Answer: B

Watch Video Solution

209. If threshold wavelength for sodium is 6800Å then the work function will be

A. 1.8 eV

B. 2.5 eV

C. 2.1 eV

D. 1.4 eV

Answer: A

Watch Video Solution

210. If intensity of incident light is increased in photo electric effect then which of the following is true ?

A. Maximum K.E. of ejected electron will increase

B. Work function will remain unchanged

C. Stopping potential will decrease

D. Maximum K.E. of ejected electron will decrease

Answer: B

Watch Video Solution

211. Light of frequency $8 \times 10^{15} Hz$ is incident on a substance of photoelectric work function $6.125eV$. The maximum kinetic energy of the emitted photoelectrons is

A. 17 eV

B. 22 eV

C. 27 eV

D. 37 eV

Answer: C

Watch Video Solution

212. The photoelectric threshold wavelength for potassium (work function being $2eV$) is

A. 310 nm

B. 620 nm

C. 1200 nm

D. 2100 nm

Answer: B

Watch Video Solution

213. Photons of energy $6eV$ are incident on a metal surface whose work function is $4eV$. The minimum kinetic energy of the emitted photo - electrons will be

A. 0 eV

B. 1 eV

C. 2 eV

D. 10 eV

Answer: A

Watch Video Solution

214. According to photon theory of light which of the following physical quantities associated with a photon do not/does not change as it collides with an electron in vacuum

A. Energy and momentum

B. Speed and momentum

C. Speed only

D. Energy only

Answer: C

Watch Video Solution

215. The lowest frequency of light that will cause the emission of photoelectrons from the surface of a metal (for which work function is $1.65eV$) will be

A. $4 \times 10^{10} Hz$

B. $4 \times 10^{11} Hz$

C. $4 \times 10^{14} Hz$

D. $4 \times 10^{-10} Hz$

Answer: C

Watch Video Solution

216. Light of two different frequencies whose photons have energies 1eV and 2.5 eV respectively illuminate a metallic surface whose work function is 0.5 eV successively. Ratio of maximum kinetic energy of emitted electrons will be:

A. $1:5$

B. $1:4$

C. $1:2$

D. $1:1$

Answer: B

Watch Video Solution

217. Sodium and copper have work functions $2.3eV$ and $4.5eV$ respectively . Then the ratio of the wavelength is nearest

A. $1:2$

B. $4:1$

C. $2:1$

D. $1:4$

Answer: C

Watch Video Solution

218. Photon of 5.5 eV energy fall on the surface of the metal emitting photoelectrons of maximum kinetic energy 4.0 eV . The stopping voltage required for these electrons are

A. 5.5 V

B. 1.5 V

C. 9.5 V

D. 4.0 V

Answer: D

Watch Video Solution

219. A caesium photocell , with a steady potential difference of $60V$ across , is alluminated by a bright point source of light $50cm$ away. When the same light is placed $1m$ away the photoelectrons emitted from the cell

A. Are one quarter as numerous

B. Are half as numerous

C. Each carry one quarter of their previous momentum

D. Each carry one quarter of their previous energy

Answer: A

Watch Video Solution

220. A radio transmitter radiates $1kW$ power at a wavelength $198.6m$. How many photons does it emit per second ?

A. 10^{10}

B. 10^{20}

C. 10^{30}

D. 10^{40}

Answer: C

Watch Video Solution

221. The number of photons of wavelength $540nm$ emitted per second by an electric bulb of power $100W$ is (taking $h = 6 \times 10^{-34}$ sec)

A. 100

B. 1000

C. 3×10^{20}

D. 3×10^{18}

Answer: C

Watch Video Solution

222. When radiation is incident on a photoelectron emitter , the stopping potential is found to be $9vo < s$. If e/m for the electrons is $1.8 \times 10^{11} Ckg^{-1}$ the maximum velocity of the ejected electrons is

A. $6 \times 10^{5} ms^{-1}$

B. $8 \times 10^{5} ms^{-1}$

C. $1.8 \times 10^6 ms^{-1}$

D. $1.8 \times 10^5 ms^{-1}$

Answer: C

Watch Video Solution

223. Two identical metal plates show photoelectric effect by a light of wavelength λ_A falls on plate A and λ_B on plate $B(\lambda_A = 2\lambda_B)$. The maximum kinetic energy is

A. $2K_A = K_B$

B. $K_A < K_B/2$

C. $K_A = 2K_B$

D. $K_A = K_B/2$

Answer: B

Watch Video Solution

224. The threshold wavelength for photoelectric effect of a metal is 6500 Å. The work function of the metal is approximately

A. 2 eV

B. 1 eV

C. 0.1 eV

D. 3 eV

Answer: A

Watch Video Solution

225. When ultraviolet radiation is incident on a surface, no photoelectrons are emitted. If another beam causes photoelectrons to be emitted from the surface, it may consist of

(i) radio waves

(ii) infrared rays

(iii) X-rays

(iv) gamma rays

A. X-rays

B. Radio wave

C. Infrared rays

D. Green house effect

Answer: A

Watch Video Solution

226. Light of frequency $4v_0$ is incident on the metal of the threshold frequency v_0. The maximum kinetic energy of the emitted photoelectrons is

A. $3hv_0$

B. $2hv_0$

C. $\frac{3}{2}hv_0$

D. $\frac{1}{2}hv_0$

Answer: A

Watch Video Solution

227. By photoelectric effect, Einstein, proved

A. $E = hv$

B. $K.E. = \frac{1}{2}mv^2$

C. $E = mc^2$

D. $E = \frac{Rhc^2}{n^2}$

Answer: A

Watch Video Solution

228. The work function of sodium is 2.3 eV . The threshold wavelength of sodium will be

A. 2900 Å

B. 2500 Å

C. 5380 Å

D. 2000 Å

Answer: C

Watch Video Solution

229. Which of the following pheniomeana exhibits particle nature of light ?

A. Refraction

B. Interference

C. Polarization

D. Photoelectric effect

Answer: D

Watch Video Solution

230. Two identical photocathodes receive light of frequency f_1 and f_2 if the velocities of the photo electrons (of mass m) coming out are respectively v_1 and v_2 then

A. $v_1 - v_2 = \left[\frac{2h}{m}(f_1 - f_2)\right]^{1/2}$

B. $v_1^2 - v_2^2 = \frac{2h}{m}(f_1 - f_2)$

C. $v_1 + v_2 = \left[\frac{2h}{m}(f_1 + f_2)\right]^{1/2}$

D. $v_1^2 + v_2^2 = \frac{2h}{m}(f_1 + f_2)$

Answer: B

Watch Video Solution

231. Consider the following two statements A and B and identify the correct choice

$A)$ When a rigid body is rotating about its own axis, at a given instant all particles of body posses same angular velocity.

$B)$ When a rigid body is rotating about its own axis, the linear velocity of a particle is directly proportional to its perpendicular distance from axis

A. Both A and B are true

B. Both A and B are false

C. A is true but B is false

D. A is false B is true

Answer: D

Watch Video Solution

232. When radiation of wavelength λ is incident on a metallic surface , the stopping potential is 4.8volts . If the same surface is illuminated with radiation of double the wavelength , then the stopping potential becomes 1.6volts. Then the threshold wavelength for the surface is

A. 2λ

B. 4λ

C. 6λ

D. 8λ

Answer: B

Watch Video Solution

233. The frequency and work function of an incident photon are v and ϕ_0. If v is the threshold frequency then necessary condition for the emission of photo electron is

A. $v < v_0$

B. $v = \frac{v_0}{2}$

C. $v \geq v_0$

D. None of these

Answer: C

Watch Video Solution

234. Light of wavelength 1824Å, incident on the surface of a metal , produces photo - electrons with maximum energy $5.3eV$. When light of wavelength 1216Å is used , maximum energy of photoelectrons is $8.7eV$. The work function of the metal surface is

A. 3.5 eV

B. 13.6 eV

C. 6.8 eV

D. 1.5 eV

Answer: D

Watch Video Solution

Watch Video Solution

235. If the energy of a photon corresponding to a wavelength of $6000 \text{Å} is 3.32 \times 10^{-19} J$, the photon energy for a wavelength of 4000Å will be

A. 1.4 eV

B. 4.9 eV

C. 3.1 eV

D. 1.6 eV

Answer: C

Watch Video Solution

236. If the wavelength of light is 4000Å, then the number of waves in $1mm$ length will be

A. 25

B. 0.25

C. 0.25×10^4

D. 25×10^4

Answer: C

Watch Video Solution

237. The velocity of photon is proportional to (where v is frequency)

A. $\frac{V^2}{2}$

B. $\frac{1}{\sqrt{v}}$

C. $\sqrt{v}$

D. v

Answer: D

Watch Video Solution

238. If the work function of a photo - metal is $6.825eV$. Its threshold wavelength will be $(c = 3 \times 10^8 m/s)$

A. 1200 Å

B. 1800 Å

C. 2400 Å

D. 3600 Å

Answer: B

Watch Video Solution

239. A photon of energy $8eV$ is incident on a metal surface of threshold frequency $1.6 \times 10^{15} Hz$, then the maximum kinetic energy of photoelectrons emitted is $(h = 6.6 \times 10^{-34} Js)$

A. 4.8 eV

B. 2.4 eV

C. 1.4 eV

D. 0.8 eV

Answer: C

Watch Video Solution

240. If the energy of the photon is increased by a factor of 4 , then its momentum

A. Does not change

B. Decreases by a factor of 4

C. Increases by a factor of 4

D. Decreases by a factor of 2

Answer: C

Watch Video Solution

241. The ratio of the energy of a photon with $\lambda = 150m$ to that with $\lambda = 300m$ is

A. 2

B. $1/4$

C. 4

D. $1/2$

Answer: A

Watch Video Solution

242. Photo-electric effect can be explained by

A. Corpusular theory of light

B. Wave nature of light

C. Bohr's theory

D. Quantum theory of light

Answer: D

Watch Video Solution

243. In a photoelectric effect , the $K.E.$ of electrons emitted from the metal surface depends upon

A. Intensity of light

B. Frequency of incident light

C. Velocity of incident light

D. Both intensity and velocity of light

Answer: B

Watch Video Solution

244. The photoelectric effect can be understood on the basis of

A. The principle of superposition

B. The electromagnetic theory of light

C. The special theory of relativity

D. Line spectrum of the atom

Answer: D

Watch Video Solution

245. If the threshold wavelength for sodium is 5420Å, then the work function of sodium is

A. 4.58 eV

B. 2.38 eV

C. 1.14 eV

D. 0.23 eV

Answer: B

Watch Video Solution

Watch Video Solution

246. The work function of a metal is

A. The energy for the electron to enter into the metal

B. The energy for producing X-ray

C. The energy for the electron to come out from metal surface

D. None of these

Answer: C

Watch Video Solution

247. The minimum wavelength of photon is 5000Å, its energy will be

A. 2.5 eV

B. 50 eV

C. 5.48 eV

D. 7.48 eV

Answer: A

Watch Video Solution

248. Which of one is correct

A. $E^2 = p^2c^2$

B. $E^2 = p^2c$

C. $E^2 = pc^2$

D. $E^2 = p^2 / c^2$

Answer: A

Watch Video Solution

249. The work function for metals A, B and C are respectively $1.92eV$, $2.0eV$ and $5eV$. According to Einstein's equation , the metals which will emit photoelectrons for a radiation of wavelength 4100Å are

A. None of these

B. A only

C. A and B only

D. All the three metals

Answer: C

Watch Video Solution

250. A photosensitive metallic surface has work function hv_0. If photons of energy $2hv_0$ fall on this surface the electrons come out with a maximum velocity of $4 \times 10^6 m/s$. When the photon energy is increases to $5hv_0$ then maximum velocity of photo electron will be

A. $2 \times 10^6 m/s$

B. $2 \times 10^7 m/s$

C. $8 \times 10^5 m/s$

D. $8 \times 10^6 m/s$

Answer: D

Watch Video Solution

251. A photocell is illuminated by a small bright source places 1 m away when the same source of light is placed $\frac{1}{2}$ m away. The number of electron emitted by photocathode would be

A. Decrease by a factor of 2

B. Increase by a factor of 2

C. Decrease by a factor of 4

D. Increase by a factor of 4

Answer: D

Watch Video Solution

252. The magnitude of saturation photoelectric current depends upon

A. Frequency

B. Intensity

C. Work function

D. Stopping potential

Answer: B

Watch Video Solution

253. For photoelectric emission , tungsten requires light of 2300Å . If light of 1800Å wavelength is incident then emission

A. Takes place

B. Don't take place

C. May or may not take place

D. Depends on frequency

Answer: A

Watch Video Solution

254. The light rays having photons of energy $1.8eV$ are falling on a metal surface having a work function $1.2eV$. What is the stopping potential to be applied to stop the emitting electrons ?

A. 3 eV

B. 1.2 eV

C. 0.6 eV

D. 1.4 eV

Answer: C

Watch Video Solution

255. The incident photon involed in the photoelectric effect experiment

A. Completely disappears

B. Comes out with an increased frequency

C. Comes out with a decreased frequency

D. Comes out without change in frequency

Answer: A

Watch Video Solution

256. A photon of energy $8eV$ is incident on metal surface of threshold frequency $1.6 \times 10^{15} Hz$, The maximum kinetic energy of the photoelectrons emitted (in eV) (Take $h = 6 \times 10^{-34} Js$).

A. 1.6

B. 6

C. 2

D. 1.2

Answer: A

Watch Video Solution

257. An X-ray tube is operated at 50 kV. The minimum wavelength produced is

A. 0.5 Å

B. 0.75 Å

C. 0.25 Å

D. 1 Å

Answer: C

Watch Video Solution

258. Which of the following wavelength falls in X - ray region

A. 10000 Å

B. 1000 Å

C. 1 Å

D. 10 Å

Answer: C

Watch Video Solution

259. A metal block is exposed to beams of X-rays of different wavelength. X-rays of which wavelength penetrate most

A. 2 Å

B. 4 Å

C. 6 Å

D. 8 Å

Answer: A

Watch Video Solution

260. X -rays and gamma rays are both electromagnetic waves. Which of the following statements is true

A. In general X-rays have larger wavelength than of gamma rays

B. X -rays have smaller wavelength than that of gamma rays

C. Gamma rays have smaller frequency than that of X - rays

D. Wavelength and frequency of X-rays are both larger than that of gamma rays

Answer: A

Watch Video Solution

261. In producing X-rays a beam of electrons accelerated by a potential difference V is made to strike a metal target. For what value of V, X-rays will have the lowest wavelength of 0.3094 Å

A. 10 kV

B. 20 kV

C. 30 kV

D. 40 kV

Answer: D

Watch Video Solution

262. In radio theraphy, X-rays are used to

A. Detect bone features

B. Treat cancer by controlled exposure

C. Detect heart disease

D. Detec fault in radio receiving circuits.

Answer: B

Watch Video Solution

263. Hydrogen atom does not emit X-rays because

A. Its energy levels are too close to each other

B. Its energy levels are too apart

C. It is too small in size

D. It has a single electron

Answer: A

Watch Video Solution

264. X-rays were discovered by

A. Becquerel

B. Roentgen

C. Marie Curie

D. Von Laue

Answer: B

Watch Video Solution

265. X-rays are

A. Stream of electrons

B. Stream of positively charged particles

C. Electromagnetic radiations of high frequency

D. Stream of uncharged particle

Answer: C

Watch Video Solution

266. The voltage applied across an X-rays tube is nearly

A. 10 V

B. 100 V

C. 100

D. 10 V

Answer: C

Watch Video Solution

267. The characteristic X-ray radiation is emitted when

A. The electrons are accelerated to a fixed energy

B. The source of electrons emits a monoenergetic beam

C. The bombarding electrons knock out electrons from the inner shell of the target atoms and one of the outer electrons falls into this vacancy

D. The valence electrons in the target atoms are removed as a result of the collision

Answer: C

Watch Video Solution

268. Molybdenum is used as a target element for production of X - rays because it is

A. A heavy element and can easily absorb high velocity electrons

B. A heavy element with a high melting point

C. An element having high thermal conductivity

D. Heavy and can easily deflect electrons

Answer: B

Watch Video Solution

269. Mosley's law relates the frequencies of line X-rays with the following characteristics of the target element

A. Its density

B. Its atomic weight

C. Its atomic number

D. Interplaner spacing of the atomic planes

Answer: C

Watch Video Solution

270. Compton effect is associated with

A. $\alpha -$ rays

B. $\beta -$ rays

C. X-rays

D. Positive rays

Answer: C

Watch Video Solution

271. X-rays are in nature similar to

A. beta rays

B. Gamma rays

C. de-Broglie waves

D. Cathode rays

Answer: B

Watch Video Solution

272. If the cathode-anode potential difference in an X-ray tube be 10 V then the maximum energy of X-ray photon can be

A. 10 J

B. 10 MeV

C. 10 MeV

D. 10 KeV

Answer: C

Watch Video Solution

273. The shorted wavelength of X- rays emitted from an X- rays tube depends on

A. Current in the tube

B. Voltage applied to the tube

C. Nature of gas in the tube

D. Atomic number of target material

Answer: B

Watch Video Solution

274. The wavelength of X-rays is of the order of

A. Centimetre

B. Micron (10 m)

C. Angstrom (10-10 m

D. Metre

Answer: C

Watch Video Solution

275. X - rays and γ - rays of the same energies may be distinguished by

A. Their velocity

B. Their ionising power

C. Their intensity

D. Method of production

Answer: D

Watch Video Solution

276. When a beam of accelerated electrons hits a target , a continuous X - ray spectrum is emitted from the target. Which of the following wavelength is absent in X - ray spectrum , if the X - ray tube is operating at $40,000 \text{volts}$?

A. 0.25 Å

B. 0.5 Å

C. 1.5 Å

D. 1.0 Å

Answer: A

Watch Video Solution

277. For continuous X-rays produced wavelength is

A. Inversely proportional to the energy of the electrons hitting the target

B. Inversely proportional to the intensity of the electron beam

C. Proportional to intensity of the electron beam

D. Proportional to target temperature

Answer: A

Watch Video Solution

278. An X-ray has a wavelength of 0.010 Å. Its momentum is

A. $2.126 \times 10 kg - m / \sec$

B. $6.626 \times 10 kg - m / \sec$

C. $3.456 \times 20 kg - m / \sec$

D. $3.313 \times 10 kg - m / \sec$

Answer: B

Watch Video Solution

279. X-rays are not used for radar purooses, because they are not,

A. They are not reflected by the target

B. They are not electromagnetic waves

C. They are completely absorbed by the air

D. They sometimes damage the target

Answer: A

Watch Video Solution

280. A direct X-ray photograph of the intestines is not generally taken by the radiologists because

A. Intestines would burst on exposure to X-rays

B. The X-rays would not pass through the intestines

C. The X-rays will pass through the intestines without causing a good shadow for any useful diagnosis

D. A very small exposure of X-rays causes cancer in the intestines

Answer: C

Watch Video Solution

281. The patient is asked to drink $BaSO_4$ for examining the stomach by X-rays because X-rays are-

A. Reflected by heavy atoms

B. Refracted by heavy atoms

C. Less absorbed by heavy atoms

D. More absorbed by heavy atoms

Answer: D

Watch Video Solution

282. X-rays can be used to study crystal structure, if the wavelength lies in the range

A. 2 Å to 0.1 Å

B. 10 Å to 5 Å

C. 50 Å to 10 Å

D. 100 Å to 50 Å

Answer: A

Watch Video Solution

283. When the accelerating voltage applied on the electrons, in an X-rays tube, is increased beyond a critical value:

A. Only the intensity of the various wavelengths is increased

B. Only the wavelength of characteristic relation is affected

C. The spectrum of white radiation is unaffected

D. The intensities of characteristic lines relative to the white spectrum are increased but there is no change in their wavelength

Answer: D

Watch Video Solution

284. The X-ray beam coming from an X-ray tube

A. Monochromatic

B. Having all wavelengths smaller than a certain maximum wavelength

C. Having all wavelengths larger than a certain minimum wavelength

D. Having all wavelengths lying between a minimum and a maximum wavelength

Answer: C

Watch Video Solution

285. The continuous X - rays spectrum produced by an X - ray machine at constant voltage has

A. A maximum wavelength

B. A minimum wavelength

C. A single wavelength

D. A minimum frequency

Answer: B

Watch Video Solution

286. Penetrating power of X - rays depends on

A. Increase in its velocity

B. Increase in its frequency

C. Increase in its intensity

D. Decrease in its velocity

Answer: B

Watch Video Solution

287. If λ_1 and λ_2 are the wavelength of characteristic X - rays and gamma rays respectively , then the relation between them is

A. $\lambda_1 = \frac{1}{\lambda_2}$

B. $\lambda_1 = \lambda_2$

C. $\lambda_1 > \lambda_2$

D. $\lambda_1 < \lambda_2$

Answer: C

Watch Video Solution

288. The wavelength λ of the K_a line of characteristic X - ray spectra varies with atomic number approximately

A. $\lambda \propto Z$

B. $\lambda \propto \sqrt{Z}$

C. $\lambda \propto \frac{1}{Z^2}$

D. $\lambda \propto \frac{1}{\sqrt{Z}}$

Answer: C

Watch Video Solution

289. The minimum frequency $v_{\min}$ of continuous X-rays is related to the applied pot. Diff V as:

A. $V \propto \sqrt{V}$

B. $v \propto V$

C. $v \propto V^{3/2}$

D. $v \propto V^2$

Answer: B

Watch Video Solution

290. If V be the accelerating voltage, then the maximum frequency of continuous X-rays is given by

A. $\frac{eh}{V}$

B. $\frac{hV}{e}$

C. $\frac{eV}{h}$

D. $\frac{h}{eV}$

Answer: C

Watch Video Solution

291. The minimum wavelength of X - rays produced by electrons accelerated by a potential difference of volts is equal to

A. $\frac{eV}{hc}$

B. $\frac{eh}{cV}$

C. $\frac{hc}{eV}$

D. $\frac{cV}{eh}$

Answer: C

Watch Video Solution

292. The potential difference applied to an X-ray tube is increased. As a result, in the emitted radiation,

A. The intensity increases

B. The minimum wavelength increases

C. The intensity decreases

D. The minimum wavelength decreases

Answer: D

Watch Video Solution

293. A potential difference of $42,000\text{volts}$ is used in an X - ray tube to accelerate electrons . The maximum frequency of the X - radiations produced is

A. $10^{19} Hz$

B. $10^{18} Hz$

C. $10^{16} Hz$

D. $10^{20} Hz$

Answer: A

Watch Video Solution

294. Which of the following is accompanied by the characteristic X - ray emission ?

A. $\alpha -$ particle emission

B. Electron emission

C. Positron emission

D. K-electron capture

Answer: D

Watch Video Solution

295. X -rays are known to be electromagnetic radiations. Therefore the X-ray photon has

A. Electric charge

B. Magnetic moment

C. Both electric charge and magnetic moment

D. Neither electric charge nor magneticm moment

Answer: D

Watch Video Solution

296. X-rays of which of the following wavelengths are hardest

A. 4 Å

B. 1 Å

C. 0.1 Å

D. 2 Å

Answer: C

Watch Video Solution

297. X-ray beam can be deflected

A. Magnetic field

B. Electric field

C. Both (a) and (b)

D. None of these

Answer: D

Watch Video Solution

298. Characteristic X-rays are produced due to

A. Break up of molecules

B. Changing in atomic energy level

C. Changing in nuclear energy level

D. Radioactive disintegration

Answer: B

Watch Video Solution

299. X-rays region lies between

A. Short radiowave and visible region

B. Visible and ultraviolet region

C. Gamma rays and ultraviolet region

D. Short radiowave and long radiowave

Answer: C

Watch Video Solution

300. The structure of solid crystals is investigated by using

A. Cosmic rays

B. X-rays

C. Infrared radiations

D. γ - rays

Answer: B

Watch Video Solution

301. In an X - rays tube , the intensity of the emitted X - rays beam is increased by

A. Increasing the filament current

B. Decreasing the filament current

C. Increasing the target potential

D. Decreasing the target potential

Answer: A

Watch Video Solution

302. The binding energy of the innermost electron in tungsten is $40keV$. To produce characteristic X - rays using a tungsten target in an X - rays tube the potential difference V between the cathode and the anti - cathode should be

A. $V < 40kV$

B. $V \leq 40kV$

C. $V > 40kV$

D. $V > / < 40kV$

Answer: C

Watch Video Solution

303. In above question the energy of the characteristic X - rays given out is

A. Less than 40 keV

B. More than 40 keV

C. Equal to 40 keV

D. $\geq 40keV$

Answer: A

Watch Video Solution

304. The wavelength of most energetic X-rays emitted when a metal target is bombarded by $40keV$ electrons, is approximately

$(h = 6.62 \times 10^{-34} J - \sec, 1eV = 1.6 \times 10^{-19} J, c = 3 \times 10^{8} m/s)$

.

A. 300 Å

B. 10 Å

C. 4 Å

D. 0.31 Å

Answer: D

Watch Video Solution

305. X - rays which can penetrate through longer distances in substance are called

A. Soft X-rays

B. Continuous X-rays

C. Hard X-rays

D. None of the above

Answer: C

Watch Video Solution

306. An X - ray machine has an accelerating potential difference of 25,000 volts. By calculation the shortest wavelength will be obtained as

$\left(h = 6.62 \times 10^{-34} J - \sec, e = 1.6 \times 10^{-19} \text{coulomb}\right)$

A. 0.25 Å

B. 0.50 Å

C. 1.00 Å

D. 2.50 Å

Answer: B

Watch Video Solution

307. Four the production of X-rays of wavelength 0.1 Å the minimum potential difference will be

A. 12.4 kV

B. 24.8 kV

C. 124 kV

D. 248 kV

Answer: C

Watch Video Solution

308. Mosley measured the frequency (f) of the characteristic X - rays from many metals of different atomic number (Z) and represented his results by a relation known as Mosley's law. This law is (a, b are constants)

A. $f = a(Z - b)^2$

B. $Z = a(f - b)^2$

C. $f^2 = a(Z - b)$

D. $f = a(Z - b)^{1/2}$

Answer: A

Watch Video Solution

309. Penetrating power of X - rays depends on

A. Current flowing in the filament

B. Applied potential difference

C. Nature of the target

D. All the above

Answer: B

Watch Video Solution

310. The energy of a photon of characteristic X-ray from a Coolidge tube comes from

A. The kinetic energy of the striking electron

B. The kinetic energy of the free electrons of the target

C. The kinetic energy of the ions of the target

D. An electronic transition of the target atom

Answer: D

Watch Video Solution

311. An X-ray tube operates on 30 kV. What is the minimum wavelength emitted

$(h = 6.6 \times 10^{-34} Js, e = 1.6 \times 10^{-19} \text{Coulomb}, c = 3 \times 10^{8} ms)$

A. 0.133 Å

B. 0.4 Å

C. 1.2 Å

D. 6.6 Å

Answer: B

Watch Video Solution

312. The wavelength of the most energetic X–ray emitted when a metal target is bombarded by 100 KeV electrons is approximately

A. 12 Å

B. 4

C. 0.31 Å

D. 0.124 Å

Answer: D

Watch Video Solution

313. An electron beam in an X-ray tube is acclerated through a potential difference of 50000 volts. These are then made to fall on a tungsten target The shortest wavelength of the X-ray emitted by the tube is

A. 2.0 Å

B. 0.25 mm

C. 0.25 cm

D. 0.025 nm

Answer: D

Watch Video Solution

314. For harder X-rays,

A. The wavelength is higher

B. The intensity is higher

C. The frequency is higher

D. The photon energy is lower

Answer: C

Watch Video Solution

315. When cathode rays strike a metal target of high melting point with very high velocity, then

A. X - rays are produced

B. Ealpha-rays are produced

C. TV waves are produced

D. Ultrasonic waves are produced

Answer: A

Watch Video Solution

316. Penetrating power of X - rays can be increased by

A. Increasing the potential difference between anode and cathode

B. Decreasing the potential difference between anode and cathode

C. Increasing the cathode filament current

D. Decreasing the cathode filament current

Answer: A

Watch Video Solution

317. K_{α} characteristic X-ray refers to the transition

A. $n = 2 \text{ to } n = 1$

B. $n = 3 \text{ to } n = 2$

C. $n = 3 \text{ to } n = 1$

D. $n = 4 \text{ to } n = 2$

Answer: A

Watch Video Solution

318. X- rays are produced in an X- rays tube operating at a given accelerating voltage . The wavelength of the continuous X- rays has values from

A. $0 \text{to} \infty$

B. $\lambda_{\min} \text{to} \infty, \text{where} \lambda_{\min} > 0$

C. $0 \text{to} \lambda_{\max} \text{where} \lambda_{\max} < \infty$

D. $\lambda_{\min} \text{to} \lambda_{\max}, \text{where} 0 < \lambda_{\min} < \lambda_{\max} < \infty$

Answer: B

Watch Video Solution

319. The wavelength of X-rays is

A. 2000 Å

B. 2 Å

C. 1 mm

D. 1 cm

Answer: B

Watch Video Solution

320. The ratio of the energy of an X - ray photon of wavelength 1 Å to that of visible light of wavelength 5000 Å is

A. $1:5000$

B. $5000:1$

C. 1.25×10

D. 25×10

Answer: B

Watch Video Solution

321. According to Mosley's law, the frequency of a spectral line in X-ray spectru varies as

A. Atomic number of the element

B. Square of the atomic number of the element

C. Square root of the atomic number of the element

D. Fourth power of the atomic number of the element

Answer: B

Watch Video Solution

322. For the structural analysis of crystals, X-rays are used because

A. X - rays have wavelength of the order of interatomic spacing

B. X - rays are highly penetrating radiations

C. Wavelength iof X-rays is of the order of nuclear size

D. X-rays are coherent radiation

Answer: A

Watch Video Solution

323. The essential distinction between X - rays and γ - rays is that

A. $\gamma -$ rays have smaller wavelength than X-rays

B. $\gamma -$ rays from nucleus while X-rays emanate from outer part of the atom

C. $\gamma -$ rays have greater ionizing power than X-rays

D. $\gamma -$ rays are more penetrating than X-rays

Answer: B

Watch Video Solution

324. The minimum wavelength of the X - rays produced by electrons accelerated through a potential difference of $V \text{volts}$ is directly proportional to

A. $\sqrt{V}$

B. V^2

C. $1/\sqrt{V}$

D. $1/V$

Answer: D

Watch Video Solution

325. What determines the hardness of the X - rays obtained from the Coolidge filament ?

A. Current in the filament

B. Pressure of air in the tube

C. Nature of target

D. Potential difference between cathode and target

Answer: D

Watch Video Solution

326. The most penetrating radiation out of the following is

A. X-rays

B. $\beta -$ rays

C. $\alpha -$ particles

D. $\gamma -$ rays

Answer: D

Watch Video Solution

327. On increasing the number of electrons striking the anode of an X - ray tube , which one of the following parameters of the resulting X - rays would increase ?

A. Penetration power

B. Frequency

C. Wavelength

D. Intensity

Answer: D

Watch Video Solution

328. What kV potential is to be applied on X-ray tube so that minimum wavelength of emitted X-ray may be $1\text{Å}\left(h = 6.625 \times 10^{-34} J - \text{sec}\right)$

A. 12.42 kV

B. 12.84 kV

C. 11.98 kV

D. 10.78 kV

Answer: A

Watch Video Solution

329. Assertion : X - rays cannot be diffracted by means of grating

.

Reason : X - rays does not obey Bragg's law.

A. Large wavelength

B. High speed

C. Short wavelength

D. None of these

Answer: C

Watch Video Solution

330. Consider the following two statements A and B and identify the correct choice in the given answer

A : The characteristic X-ray spectrum depends on the nature of the material of the target

B : The short wavelength limit of continuous X-ray spectrum varies inversely with the potential difference applied to the X-rays tube

A. A is true and B is false

B. A is false and B is true

C. Both A and B are true

D. Both A and B are false

Answer: C

Watch Video Solution

331. The energy of X-ray photon of wavelength 1.65 Å is

$(h = 6.6 \times 10^{-34} J - \sec, c = 3 \times 10^{8} ms^{-1}, 1eV = 1.6 \times 10^{-19} J)$

A. 3.5 keV

B. 5.5 keV

C. 7.5 keV

D. 9.5 keV

Answer: C

Watch Video Solution

332. If $\lambda = 10\text{Å}$ law for X-rays is

A. Infra-red

B. Microwave

C. Ultra-violet

D. X-rays

Answer: D

Watch Video Solution

333. Bragg's law for X-rays is

A. $d \sin \theta = 2n\lambda$

B. $2d \sin \theta = n\lambda$

C. $n \sin \theta = 2\lambda d$

D. None of these

Answer: B

Watch Video Solution

334. The X-rays produced in a coolidge tube of potential difference 40 V have minimum wavelength of

A. $3.09 \times 10^{-8} m$

B. $5.09 \times 10^{8} m$

C. $4.09 \times 10^{-8} m$

D. $1.09 \times 10^{8} m$

Answer: A

Watch Video Solution

335. For the production of X-rays, the target should be made of

A. Steel

B. Copper

C. Aluminium

D. Tungsten

Answer: D

Watch Video Solution

336. Intensity of X-rays depends upon the number of

A. Electrons

B. Protons

C. Neutrons

D. Positrons

Answer: A

Watch Video Solution

337. The maximum kinetic energy of the electrons hitting a target so as to produce X-ray of wavelength 1 Å is

A. 13375 eV

B. 12375 eV

C. 14375 eV

D. 15375 eV

Answer: B

Watch Video Solution

338. Energy of K - shell electron be $-40000eV$. If $60000V$ potential is applied at Coolidge tube then which of the following X - rays will get form ?

A. Continuous

B. White X-rays

C. Continuous and all series of characteristic

D. None of these

Answer: C

Watch Video Solution

339. For production of characteristic $K_{\beta}X - rays$, the electron transition is

A. $n = 2 \text{to} n = 1$

B. $n = 3 \text{to} n = 2$

C. $n = 3 \text{to} n = 1$

D. $n = 4 \text{to} n = 2$

Answer: C

Watch Video Solution

340. Penetrating power of X - rays does not depend on

A. Wavelength

B. Energy

C. Potential difference

D. Current in the filament

Answer: D

Watch Video Solution

341. The potential difference applied to an X-ray tube is 5k V and the current through it is 3.2 mA. Then, the number of electrons striking the target per second is. (a) 2×10^{16} (b) 5×10^{6} (c) 1×10^{17} (d) 4×10^{15}.

A. 2×10^{16}

B. 5×10^{16}

C. 1×10^{17}

D. 4×10^{15}

Answer: A

Watch Video Solution

342. For the production of characteristic K_{γ}, x-ray, the electron transition is

A. $n = 2 \text{ to } n = 1$

B. $n = 3 \text{ to } n = 2$

C. $n = 3 \text{ to } n = 1$

D. $n = 4 \text{ to } n = 1$

Answer: D

Watch Video Solution

343. When X rays pass through a strong uniform magnetic field. Then they

A. Do not get deflected at all

B. Get deflected in the direction of the field

C. Get deflected in the direction opposite to the field

D. Get deflected in the direction perpendicular to the field

Answer: A

Watch Video Solution

344. If the potential difference applied across x-ray tube is V volts, then approximately minimum wavelength of the emitted X-rays will be

A. $\frac{1227}{\sqrt{V}}$Å

B. $\frac{1240}{V}$Å

C. $\frac{2400}{V}$Å

D. $\frac{12400}{V}$Å

Answer: D

Watch Video Solution

345. Statement I : Penetration power of hard X-ray is more than that of soft X-ray.

Statement II : Hard X-ray is used for engineering purpose while soft X-ray is used for medical purpose.

A. Velocity

B. Intensity

C. Frequency

D. Polarization

Answer: C

Watch Video Solution

346. X - ray will travel minimum distance in

A. Air

B. Iron

C. Wood

D. Water

Answer: B

Watch Video Solution

347. The minimum wavelength of X-ray emitted by X-rays tube is 0.4125 Å. The accelerating voltage is

A. 30 kV

B. 50 kV

C. 80 kV

D. 60 kV

Answer: A

Watch Video Solution

348. Characteristic X-rays are produced due to

A. Transfer of momentum in collision of electrons with target atoms

B. Transition of electrons from higher to lower electronic orbits in an atom

C. Heating of the target

D. Transfer of energy in collision of electrons with atoms in the target

Answer: B

Watch Video Solution

349. X - rays when incident on a metal

A. Exert a force on it

B. Transfer energy to it

C. Transfer pressure to it

D. All of the above

Answer: D

Watch Video Solution

350. Find the cutoff wavelength for the continuous X-rays coming from an X-ray tube operating at $40kV$.

A. 0.31 Å

B. 3.1 Å

C. 31 Å

D. 311 Å

Answer: A

Watch Video Solution

351. The potential difference between the cathode and the target in a Collidge tube is 100 kV . The minimum wavelength of the X-rays emitted by the tube is

A. 0.66 Å

B. 9.38 Å

C. 0.246 Å

D. 0.123 Å

Answer: D

Watch Video Solution

352. X-rays are produced by accelerating electrons by voltage V and let they strike a metal of atomic number Z . The highest frequency of $X - rays$ produced is proportional to

A. V

B. Z

C. $(Z - 1)$

D. $(Z - 1)^2$

Answer: D

Watch Video Solution

353. If the operating potential of an X-ray tube if 50 kV, the velocity of X-rays coming out of it

A. $4 \times 10^4 m / s$

B. $3 \times 10^8 m / s$

C. $10^8 m / s$

D. $3m / s$

Answer: B

Watch Video Solution

354. If the voltage of X-ray tube is doubled, the intensity of X-rays will become

A. Half

B. Unchanged

C. Double

D. Four times

Answer: B

Watch Video Solution

355. If the minimum wavelength obtained in an X - ray tube is $2.5 \times 10^{-10} m$, the operating potential of the tube will be

A. 2 kV

B. 3 kV

C. 4 kV

D. 5 kV

Answer: D

Watch Video Solution

Watch Video Solution

356. The wavelength of X - rays decreases , when

A. Temperature of target is increased

B. Intensity of electron beam is increased

C. K.E. of electrons striking the target is increased

D. K.E. of electrons striking the target is decreased

Answer: C

Watch Video Solution

357. X-rays are produced in laboratory by

A. Radiation

B. Decomposition of the atom

C. Bombardment of high energy electron on heavy metal

D. None of these

Answer: C

Watch Video Solution

358. In vacuum an electron of energy $10keV$ hits tungsten target, then emitted radiation will be

A. Cathode rays

B. X-rays

C. Infrared rays

D. Visible spectrum

Answer: B

Watch Video Solution

Watch Video Solution

359. X-rays of $\lambda = 1\text{Å}$ have frequency

A. $3 \times 10^{8} Hz$

B. $3 \times 10^{18} Hz$

C. $3 \times 10^{10} Hz$

D. $3 \times 10^{15} Hz$

Answer: B

Watch Video Solution

360. Solid targets of different elements are bombarded by highly energetic electron beam. The frequcny (f) of the characteristic X-rays emitted from different targets varies with atomic number Z as

A. $f \propto \sqrt{Z}$

B. $f \propto Z^2$

C. $f \propto Z$

D. $f \propto Z^{3/2}$

Answer: B

Watch Video Solution

361. Compton effect shows that

A. X-rays are waves

B. X-rays have high energy

C. X-rays can penetrate matter

D. Photons have momentum

Answer: D

Watch Video Solution

362. An X - ray tube with a copper target emits CuK_{α} line of wavelength 1.50Å. What should be the minimum voltage through which electrons are to be accelarated to produce this wavelength of X - rays ?

$\left(h = 6.63 \times 10^{-34} J - \text{sec}, c = 3 \times 10^{8} m/s\right)$

A. 8280 V

B. 828 V

C. 82800 V

D. 8.28 V

Answer: A

Watch Video Solution

Watch Video Solution

363. In X-ray spectrum wavelength λ of line K_{α} depends on atomic number Z as

A. $\lambda \propto Z^2$

B. $\lambda \propto (Z-1)^2$

C. $\lambda \propto \frac{1}{(Z-1)}$

D. $\lambda \propto \frac{1}{(Z-1)^2}$

Answer: D

Watch Video Solution

364. Absorption of X-ray is maximum in which of the following different sheets

A. Copper

B. Gold

C. Beryllium

D. Lead

Answer: D

Watch Video Solution

365. The wavelength of K_{α} line in copper is 1.54Å. The ionisation energy of K electron in copper in Joule is

A. 11.2×10^{-27}

B. 12.9×10^{-16}

C. $1.7x10^{-15}$

D. 10×10^{-16}

Answer: B

Watch Video Solution

366. The wavelength of K_{α} line for an element of atomic number $43 is \lambda$. Then the wavelength of K_{α} line for an element of atomic number 29 is

A. $\frac{43}{29}\lambda$

B. $\frac{42}{28}\lambda$

C. $\frac{9}{4}\lambda$

D. $\frac{4}{9}\lambda$

Answer: C

Watch Video Solution

367. In X-ray experiment K_{α}, K_{β} denotes

A. Characteristic

B. Continuous wavelength

C. $\alpha, \beta -$ emissions respectively

D. None of these

Answer: A

Watch Video Solution

368. A $1\mu A$ beam of protons with a cross - sectional area of $0.5 sq. mm$ is moving with a velocity of $3 \times 10^{4} ms^{-1}$. Then charge density of beam is

A. $6.6 \times 10^{-4} C/m^{3}$

B. $6.6 \times 10^{-5} C/m^{3}$

C. $6.6 \times 10^{-6} C / m^3$

D. None of these

Answer: B

Watch Video Solution

369. A particle of a mass M at rest decays into two particles of masses m_1 and m_2 having non-zero velocities. What is the ratio of the de-Broglie wavelength of the two particles?

A. m_1 / m_2

B. m_2 / m_1

C. 1.0

D. $\sqrt{m_2} / \sqrt{m_1}$

Answer: C

Watch Video Solution

370. A photon and an electron have equal energy E. $\lambda_{\text{photon}} / \lambda_{\text{electron}}$ is proportional to

A. $\sqrt{E}$

B. $1 / \sqrt{E}$

C. $1 / E$

D. Does not depend opon E

Answer: B

Watch Video Solution

371. When photons of energy $4.25 eV$ strike the surface of metal A, the ejected photoelectrons have maximum kinetic energy T_A eV

and De-broglie wavelength λ_A. The maximum energy of photoelectron liberated from another metal B by photon of energy 4.70 eV is $T_B = (T_A - 1.50)eV$ if the de Brogle wavelength of these photoelectrons is $\lambda_B = 2\lambda_A$, then

A. The work function of A is 2.25 eV

B. The work function of B is 4.20 eV

C. $T_A = 2.00eV$

D. $T_B = 2.75eV$

Answer: A::B::C

Watch Video Solution

372. An image of the sun is formed by a lens, of the focal length of 30 cm, on the metal surface of a photoelectric cell and a photoelectric current I is produced. The lens forming the image is then replaced by another of the same diameter but of focal length 15 cm. The photoelectric current in this case is

A. $\frac{I}{2}$

B. I

C. $2I$

D. $4I$

Answer: D

Watch Video Solution

373. When an inert gas is filled in the place vacuum in a photo cell , then

A. Photo-electric current is decreased

B. Photo-electric current is increased

C. Photo-electric current remains the same

D. Decrease or increase in photo-electric current does not depend upon the gas filled

Answer: B

Watch Video Solution

374. A photon of $1.7 \times 10^{-13} jo\underline{e}s$ is absorbed by a material under special circumstances. The correct statement is

A. Electrons of the atom of absorbed material will go the higher energy states

B. Electron and positron pair will be created

C. Only positron will be produced

D. Photoelectric effect will occur and electron will be produced

Answer: B

Watch Video Solution

375. The maximum velocity of an electron emitted by light of wavelength λ incident on the surface of a metal of work function ϕ, is

Where h = Planck's constant , m = mass of electron and c = speed of light.

A. $\left[\frac{2(hc+\lambda\phi)}{m\lambda}\right]^{1/2}$

B. $\frac{2(hc-\lambda\phi)}{m}$

C. $\left[\frac{2(hc-\lambda\phi)}{m\lambda}\right]^{1/2}$

D. $\left[\frac{2(h\lambda-\phi)}{m}\right]^{1/2}$

Answer: C

Watch Video Solution

376. When a monochromatic point source of light is at a distance of 0.2 m from a photoelectric cell, the cut off voltage and the saturation current

are respectively 0.6 V and 18.0 mA. If the same source is placed 0.6 m away

from the photoelectric cell, then

A. The stopping potential will be 0.2 V

B. The stopping potential will be 0.6 V

C. The saturation current will be 6 mA

D. The saturation current will be 18 mA

Answer: B

Watch Video Solution

377. In a photoemissive cell, with exciting wavelength λ, the faster electron has speed v. If the exciting wavelength is changed to $3\lambda/4$, the speed of the fastest electron will be

A. $v(3/4)^{1/2}$

B. $v(4/3)^{1/2}$

C. Less than $v(4/3)^{1/2}$

D. Greater than $v(4/3)^{1/2}$

Answer: D

Watch Video Solution

378. Ultraviolet light of wavelength 300nn and intensity $1.0Wm^{-2}$ falls on the surface of a photosensitive material. If one per cent of the incident photons produce photoelectrons, then the number of photoelectrons emitted per second from an area of 1.0 cm^2 of the surface is nearly

A. 9.61×10^{14} per sec

B. 4.12×10^{13} pec sec

C. 1.51×10^{12}

D. 2.13×10^{11} per sec

Answer: C

Watch Video Solution

379. Photoelectric emission is observed from a metallic surface for frequencies v_1 and v_2 of the incident light rays $(v_1 > v_2)$. If the maximum values of kinetic energy of the photoelectrons emitted in the two cases are in the ratio of $1 : k$, then the threshold frequency of the metallic surface is

A. $\frac{v_1 - v_2}{k - 1}$

B. $\frac{kv_1 - v_2}{k - 1}$

C. $\frac{kv_2 - v_1}{k - 1}$

D. $\frac{v_2 - v_1}{k}$

Answer: B

Watch Video Solution

380. Light from a hydrogen tube is incident on the cathode of a photoelectric cell the work function of the cathode surface is $4.2eV$. In order to reduce the photo - current to zero the voltage of the anode relative to the cathode must be made

A. $-4.2V$

B. $-9.4V$

C. $-17.8V$

D. $+9.4V$

Answer: B

Watch Video Solution

381. Work function of lithium and copper are respectively $2.3eV$ and $4.0eV$. Which one of the metal will be useful for the photoelectric cell working with visible light ?

$(h = 6.6 \times 10^{-34} J - s, c = 3 \times 10^{8} m/s)$

A. Lithium

B. Copper

C. Both

D. None of these

Answer: A

Watch Video Solution

382. X-rays of wavelength 0.1Å allowed to fall on a metal get scattered. The wavelength of scattered radiation of 0.111Å. If $h = 6.624 \times 10 J - s$ and $m = 9 \times 10 kg$, then the direction of the scattered photons will be

A. $\cos(0.547)$

B. $\cos.\ (0.4484)$

C. $\cos.\ (0.5)$

D. $\cos.\ (0.3)$

Answer: A

Watch Video Solution

383. The largest distance between the interatomic planes of crystal is $10^{-7}cm$. The upper limit for the wavelength of X - rays which can be usefully studied with this crystal is

A. 1 Å

B. 2 Å

C. 10 Å

D. 20 Å

Answer: D

Watch Video Solution

384. An X-ray tube is operated at $50kV$ and $20mA$. The target material of the tube has mass of $1kg$ and specific heat $495Jkg^{-1}$

^(@)C^(-1)`. One perent of applied electric power is converted into X-rays and the remaining energy goes into heating the target. Then,

A. A suitable target material must have a high melting temperature

B. A suitable target material must have low thermal conductivity

C. The average rate of rise of temperature of target would be $2.^{\circ} C / s$

D. The minimum wavelength of the x-rays emitted is about $0.25 \times 10^{-10} m$

Answer: A::C::D

Watch Video Solution

385. The wavelength of k_{α} X- rays produced by an X - rays tube is 0.76Å . The atomic number of the anode material of the tube is ....

A. 20

B. 60

C. 40

D. 80

Answer: C

Watch Video Solution

386. X-ray beam of intensity I_0 passes through an absorption plate of thickness d. If absorption coefficient of material of plant is μ, the correct statement regarding the transmitted intensity l of X-ray is

A. $I = I_0(1 - e^{-\mu t})$

B. $I = I_0 e^{-\mu d}$

C. $I = I_0\left(1 - e^{-\mu / d}\right)$

D. $I = I_0 e^{-\mu / d}$

Answer: B

Watch Video Solution

387. The K_α X-ray emission line of lungsten accurs at $\lambda = 0.021 nm$. What is the energy difference between $K$and L levels in the atom?

A. 0.51 MeV

B. 1.2 MeV

C. 59 KeV

D. 13.6 eV

Answer: C

Watch Video Solution

388. Electrons with energy $80keV$ are incident on the tungsten target of an X - rays tube , k- shell electrons of tungsten have $72.5keV$ energy X- rays emitted by the tube contain only

A. A continuous X - ray spectrum (Bremsstrahlung) with a minimum wavelength of ~0.155Å

B. A continuous X - ray spectrum (Bremsstrahlung] with all wavelengths

C. The characteristic X - rays spectrum of tungsten

D. A continuous X - ray spectrum (Bremsstrahlung) with a minimum wavelength of ~0.155Å and the characteristic X - ray spectrum of tungsten

Answer: D

Watch Video Solution

389. The X- ray wavelength of L_{α} line of platinum $(Z = 78)$ is 1.30Å. The X - ray wavelength of L_{α} line of Molybdenum $(Z = 42)$ is

A. 5.41 Å

B. 4.20 Å

C. 2.70 Å

D. 1.35 Å

Answer: A

Watch Video Solution

390. Find the ratio of de Broglie wavelength of molecules of hydrogen and helium which are at temperatures 27° and $127^{\circ}C$, respectively.

A. $\frac{1}{2}$

B. $\sqrt{\frac{3}{8}}$

C. $\sqrt{\frac{8}{3}}$

D. 1

Answer: C

Watch Video Solution

391. A silver of radius $4.8cm$ is suspended by a thread in the vacuum chamber . UV light of wavelength $200nm$ is incident on the ball for some times during which a total energy of $1 \times 10^{-7} J$ falls on the surface . Assuming on an average one out of 103 photons incident is able to eject electron. The potential on sphere will be

A. 1 V

B. 2 V

C. 3 V

D. Zero

Answer: C

Watch Video Solution

392. A photon of wavelength 6630Å is incident on a totally reflecting surface . The momentum delivered by the photon is equal to

A. $6.63 \times 10 kg - m / \sec$

B. $2 \times 10 kg - m / \sec$

C. $10 kg - m / \sec$

D. None of these

Answer: B

Watch Video Solution

393. The ratio of de - Broglie wavelength of α- particle to that of a proton being subjected to the same magnetic field so that the radii of their path are equal to each other assuming the field induction vector $\overrightarrow{B}$ is perpendicular to the velocity vectors of the α - particle and the proton is

A. 1

B. $\frac{1}{4}$

C. $\frac{1}{2}$

D. 2

Answer: C

Watch Video Solution

394. k_a wavelength emitted by an atom of atomic number $Z = 11$ is λ find the atomic number for an atom that emils k_a radiation with wavelength 4λ.

A. $Z = 6$

B. $Z = 4$

C. $Z = 11$

D. $Z = 44$

Answer: A

Watch Video Solution

395. The potential energy of a partical varies as .

$U(x) = E_0$ for $0 \leq x \leq 1$

$= 0$ for $x > 1$

for $0 \leq x \leq 1$ de- Broglie wavelength is λ_1 and for $x > 1$ the de-Broglie wavelength is λ_2. Total energy of the partical is $2E_0$. find $\frac{\lambda_1}{\lambda_2}$.

A. 2

B. 1

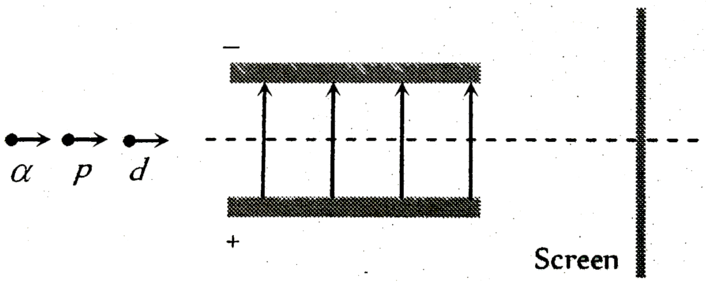
C. $\sqrt{2}$

D. $\frac{1}{\sqrt{2}}$

Answer: C

Watch Video Solution

396. A proton, a deutron and an α-particle having the same momentum, enters a region of uniform electric field between the parallel plates of a capacitor. The electric field is perpendicular to the initial path of the particles. Then the ratio of deflections suffered by them is



A. $1:2:8$

B. $1:2:4$

C. $1:1:2$

D. None of these

Answer: A

Watch Video Solution

397. In order to coincide the parabolas formed by singly ionized ions in one spectrograph and doubly ionized ions in the other Thomson's mass spectrograph , the electric fields and magnetic fields are kept in the ratios $1:2$ and $3:2$ respectively . Then the ratio of masses of the ions is

A. $3:4$

B. $1:3$

C. $9:4$

D. None of these

Answer: C

Watch Video Solution

398. Let $\lambda_{\alpha}{}'$, λ_{β}, and λ'_{α} denote the wavelength of the X-ray of the K_{α}, K_{β}, and L_{α} lines in the characteristic X-rays for a metal. Then.

A. $\lambda_{\alpha} > \lambda'_{\alpha} > \lambda_{\beta}$

B. $\lambda'_{\alpha} > \lambda_{\beta} > \lambda_{\alpha}$

C. $\dfrac{1}{\lambda_{\beta}} = \dfrac{1}{\lambda_{\alpha}} + \dfrac{1}{\lambda'_{\alpha}}$

D. $\dfrac{1}{\lambda_{\alpha}} + \dfrac{1}{\lambda_{\beta}} = \dfrac{1}{\lambda'_{\alpha}}$

Answer: C

Watch Video Solution

399. The minimum intensity of light to be detected by human eye is $10^{-10}W/m^2$. The number of photons of wavelength $5.6 \times 10^{-7}m$ entering the eye , with pupil area $10^{-6}m^2$, per second for vision will be nearly

A. 100

B. 200

C. 300

D. 400

Answer: C

Watch Video Solution

400. In X-ray tube , when the accelerating voltage V is halved, the difference between the wavelength of K_{α} line and minimum wavelength of continuous X-ray spectrum

A. Remains constant

B. Becomes more than two times

C. Becomes half

D. Becomes less than two times

Answer: D

Watch Video Solution

401. In a photocell bichromatic light of wavelength 2475Å and 6000Å are incident on cathode whose work function is $4.8eV$. If a uniform magnetic field of $3 \times 10^{-5} Tesla$ exists parallel to the plate , the radius of the path describe by the photoelectron will be (mass of electron $= 9 \times 10^{-31} kg$)

A. 1 cm

B. 5 cm

C. 10 cm

D. 25 cm

Answer: B

Watch Video Solution

402. Two metallic plates A and B , each of area $5 \times 10m$ are placed parallel to each other at a separation of 1 cm . Plate B carries a positive charge of 33.7 pc . A monochromatic beam of light, with photons of energy 5 eV each, starts falling on plate A at t = 0, so that 10 photons fall on it per square meter per second. Assume that one photoelectron is emitted for every 10 incident photons. Also assume that all the emitted photoelectrons are collected by plate B and the work function of plate A remains constant at the value 2 eV . Electric field between the plates at the end of 10 seconds is

A. $2 \times 10N/C$

B. $10N/C$

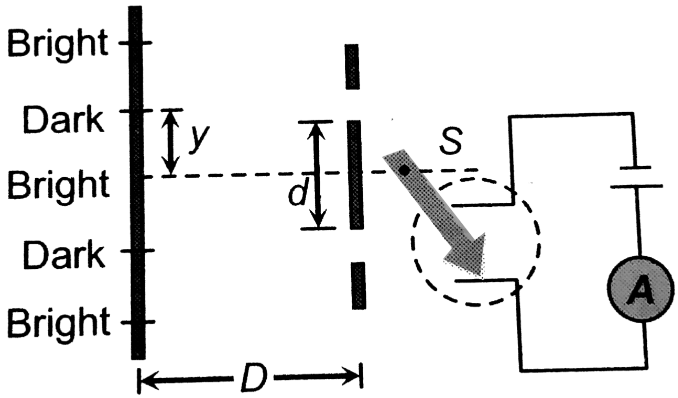
C. $5 \times 10N/C$

D. Zero

Answer: A

Watch Video Solution

403. In the following arrangement $y = 1.0mm$, $d = 0.24mm$ and $D = 1.2m$. The work function of the material of the emitter is $2.2eV$. The stopping potential V needed to stop the photo current will be



A. 0.9 V

B. 0.5 V

C. 0.4 V

D. 0.1 V

Answer: A

Watch Video Solution

404. The eye can detect 5×10^{4} photons $\left(m^{2}s\right)^{-1}$ of green light $(\lambda = 5000A)$, whole ear can detect $10^{-13} Wm^{2}$. As a power detector, which is more sensitive and by what factor?

A. 5

B. 10

C. 10

D. 15

Answer: A

Watch Video Solution

405. A photon collides with a stationary hydrogen atom in ground state inelastically. Energy of the colliding photon is 10.2 eV. After a time interval of the order of micro second another photon collides with same hydrogen atom inelastically with an energy of 15eV. What wil be observed by the detector?

(a) 2 photons of energy 10.2 eV

(b) 2 photons of energy 1.4 eV

(c) One photon of energy 10.2 eV and an electron of energy 1.4 eV

(d) One photon of energy 10.2 eV and another photon of energy 1.4 eV

A. 2 photon of energy 10.2 eV

B. 2 photon of energy of 1.4 eV

C. One photon of energy 10.2 eV and an electron of energy 1.4 eV

D. One photon of energy 10.2 eV and another photon of 1.4 eV

Answer: C

Watch Video Solution

406. The curve drawn between velocity and frequency of a photon in vacuum will be

A. Straight line parallel to frequency axis

B. Straight line parallel to velocity axis

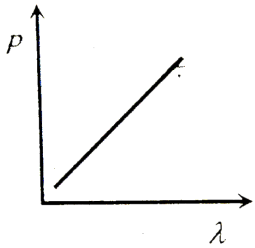
C. Straight line passing through origin and making an angle of 45o with frequency axis

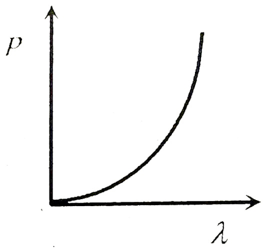
D. Hyperbola

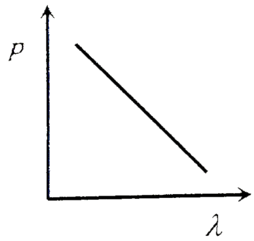
Answer: A

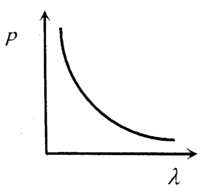
Watch Video Solution

407. Which of the following figure represents the variation of particle momentum and the associated de - Broglie wavelength ?

A.


B.


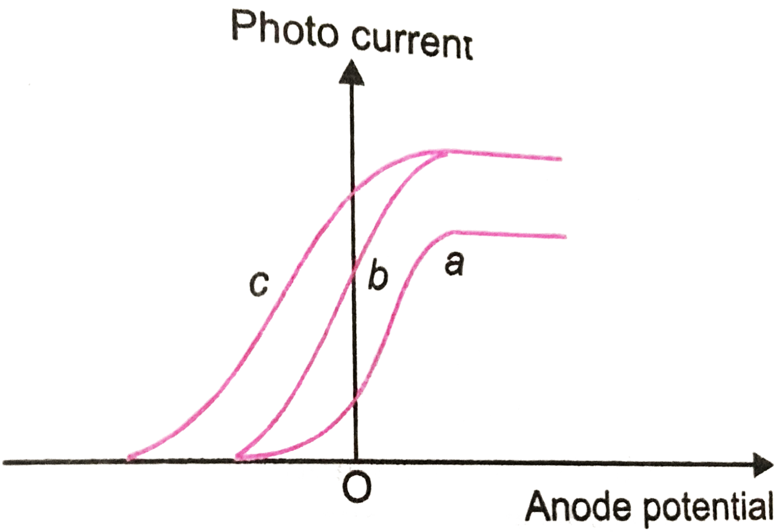
C.


D.
(d)


Answer: D

Watch Video Solution

408. The fig. shows the variation of photon current with anode potential for a photo-sensitive surface for three different radiation. Let I_a, I_b and I_c be the intensities and f_a, f_b and f_c be the frequency for the curves a,b and c respectively.



A. $f_a = f_b$ and $l_a \neq l_b$

B. $f_a = f_c$ and $l_a = l_c$

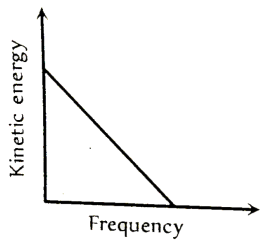
C. $f_a = f_b$ and $l_a = l_b$

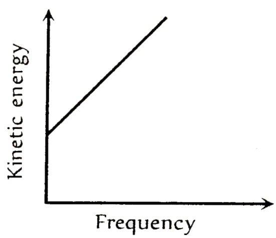
D. $f_a = f_b$ and $l_a = l_b$

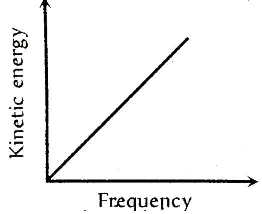
Answer: A

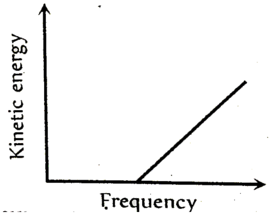
Watch Video Solution

409. According to Einstein's photoelectric equation , the graph between the kinetic energy of photoelectrons ejected and the frequency of incident radiation is

A. 

B. 

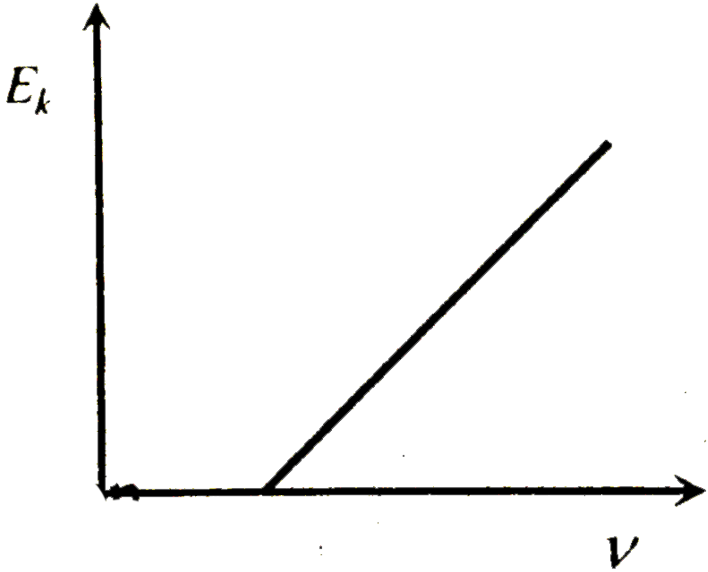
C. 

D. 

Answer: D

Watch Video Solution

410. For the photoelectric effect, the maximum kinetic energy E_k of the emitted photoelectrons is plotted against the frequency ν of the incident photons as shown in the figure. The slope of the curve gives



A. Charge of the electron

B. Work function of the metal

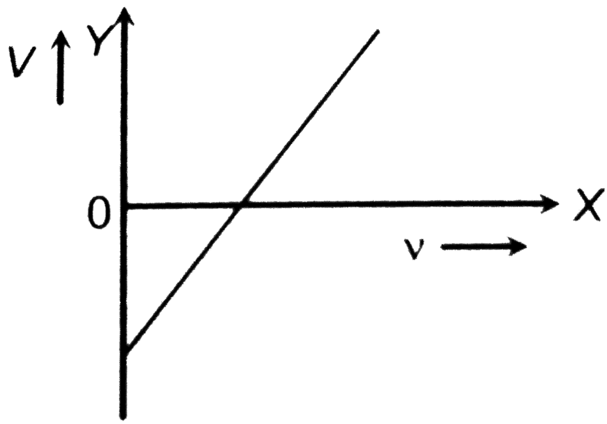
C. Planck's constant

D. Ratio of the Planck's constant to electronic charge

Answer: C

Watch Video Solution

411. The stopping potential V for photoelectric emission from a metal surface is plotted along Y - axis and frequency v of incident light along X - axis . A straight line is obtained as shown . Planck's constant is given by



A. Slope of the line

B. Product of slope on the line and charge on the electron

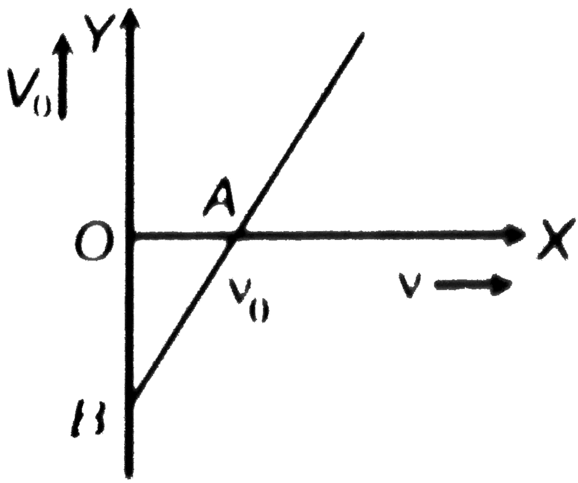
C. Product of intercept along Y - axis and mass of the electron

D. Product of Slope and mass of electron

Answer: B

Watch Video Solution

412. In an experiment on photoelectric effect the frequency f of the incident light is plotted against the stopping potential V_0. The work function of the photoelectric surface si given by (e is the electronic charge)



A. OB $\times$ e in Ev

B. OB in volt

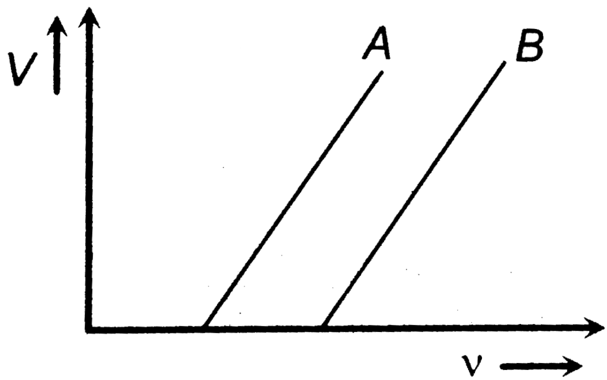
C. OA in eV

D. The slope of the line AB

Answer: A

Watch Video Solution

413. The stopping potential as a function of the frequency of the incident radiation is plotted for two different photoelectric surfaces A and B. The graphs show that work function of A is



A. Greater than that of B

B. Smaller than that of B

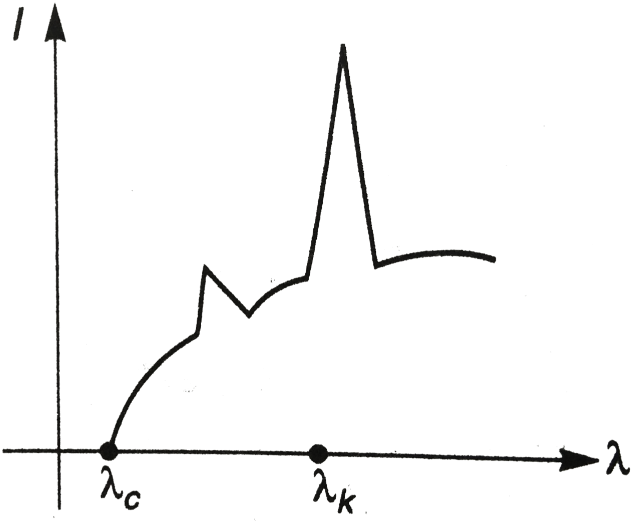
C. Equal to that of B

D. No inference can be drawn about their work functions from the given graphs

Answer: C

Watch Video Solution

414. The intensity of X-rays form a Coolidge tube is plotted against wavelength λ as shown in the figure. The minimum wavelength found is λ_c and the wavelength of the K_α line is λ_k. As the accelerating voltage is increased



(a) $\lambda_k - \lambda_c$ increases (b) $\lambda_k - \lambda_c$ decreases

(c) λ_k increases (d) λ_k decreases

A. $(\lambda_K - \lambda_C)$ increases

B. $(\lambda_K - \lambda_C)$ decreases

C. λ_K increases

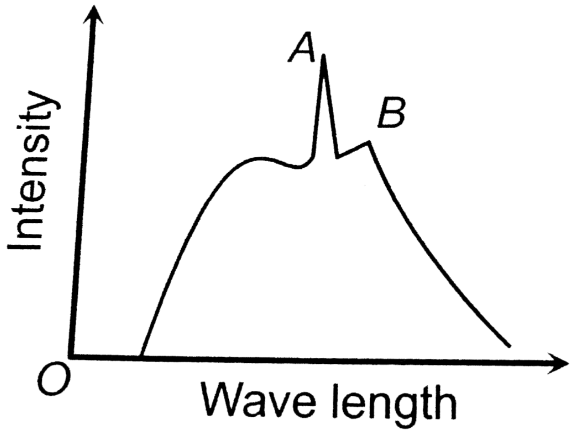
D. λ_K decreases

Answer: A

Watch Video Solution

Watch Video Solution

415. The figure represents the observed intensity of X - rays emitted by an X - ray tube as a function of wavelength . The sharp peaks A and B denote



A. Band spectrum

B. Continuous spectrum

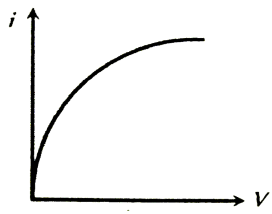
C. Characteristic radiations

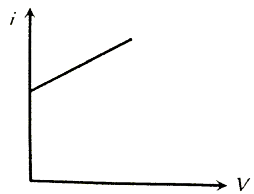
D. White radiations

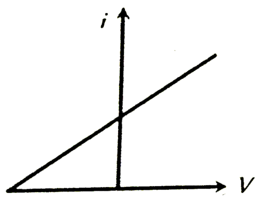
Answer: C

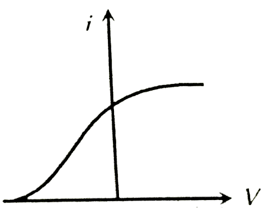
Watch Video Solution

416. The curve between current (i) and potential difference (V) for a photo cell will be

A. 

B. 

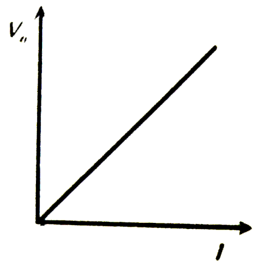
C. 

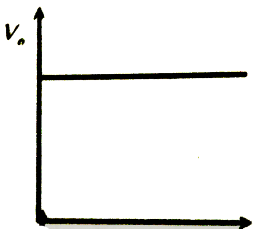
D. 

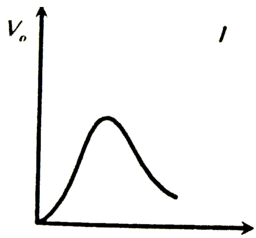
Answer: D

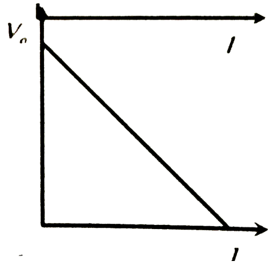
Watch Video Solution

417. The correct curve between the stopping potential (V) and intensity of incident light (I) is

A. 

B. 

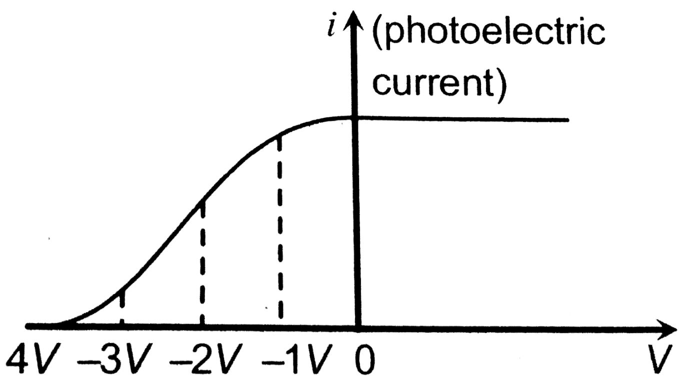
C. 

D. 

Answer: B

Watch Video Solution

418. The value of stopping potential in the following diagram



A. $-4V$

B. $-3V$

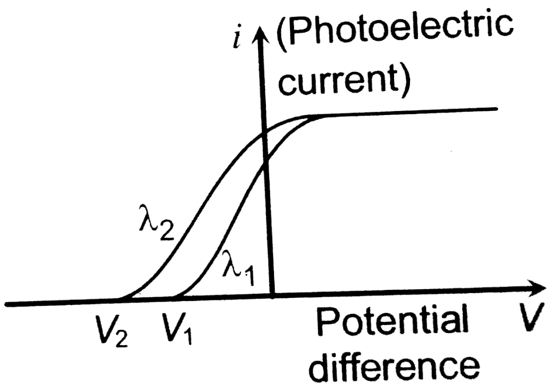
C. $-2V$

D. $-1V$

Answer: A

Watch Video Solution

419. In the following diagram if $V_2 > V_1$ then



A. $\lambda_1 = \sqrt{\lambda_2}$

B. $\lambda_1 < \lambda_2$

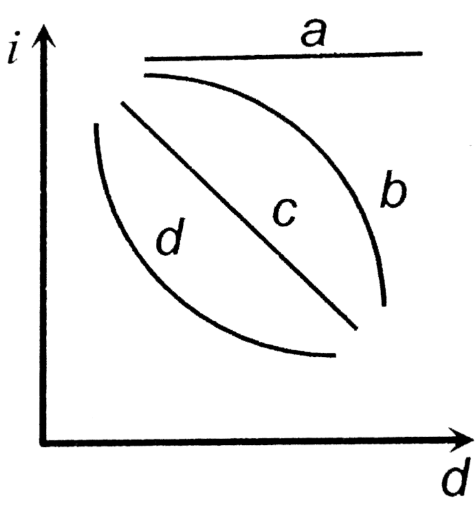
C. $\lambda_1 = \lambda_2$

D. $\lambda_1 > \lambda_2$

Answer: D

Watch Video Solution

420. A point source of light is used in an experiment on photoelectric effect . Which of the following curves best represents the variation of photo current (i) with distance (d) of the source from the emitter ?



A. a

B. b

C. c

D. d

Answer: D

Watch Video Solution

421. According to Einstein's photoelectric equation, the plot of the maximum kinetic energy of the emitted photoelectrons from a metal versus frequency of the incident radiation gives a straight line whose slope

A. Is the same for all metals and independent of the intensity of the radiation

B. Depends on the intensity of the radiation

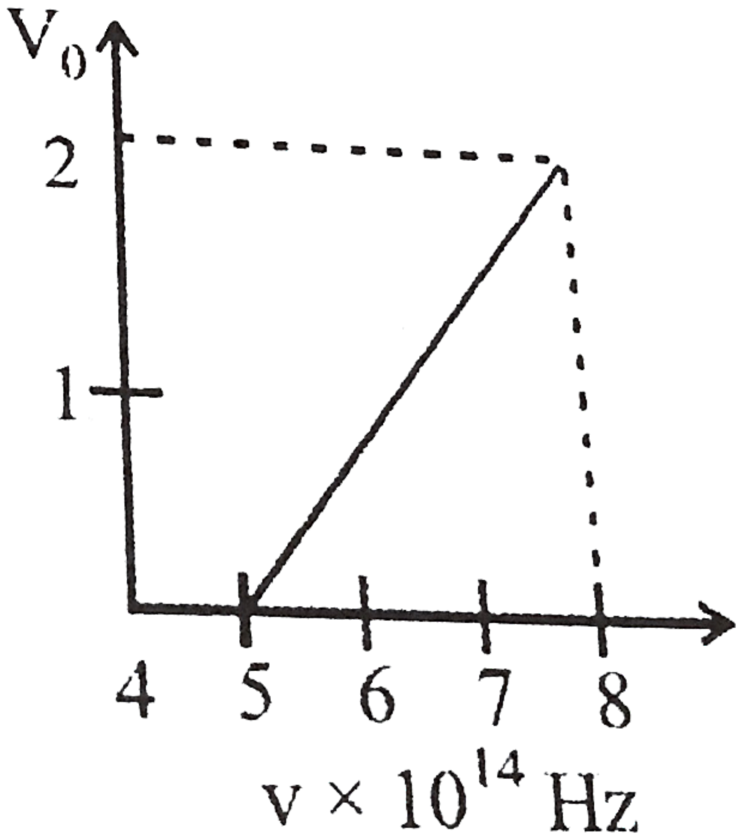
C. Depends both on the intensity of the radiation and the metal used

D. Depends on the nature of the metals used

Answer: A

Watch Video Solution

422. The stopping potential (V_0) versus frequency (v) plot of a substance is shown in figure, the threshold wavelength is



A. $5 \times 10^{14} m$

B. 6000 Å

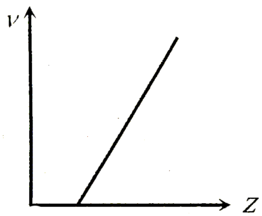
C. 5000 Å

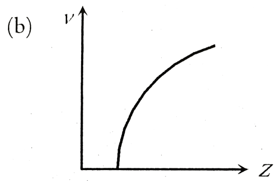
D. Can not be estimated from given data

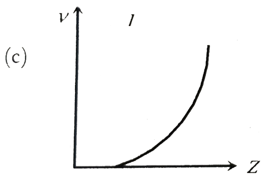
Answer: B

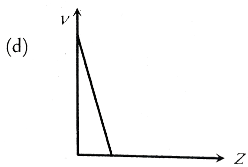
Watch Video Solution

423. The graph that correctly represents the relation of frequency v of a particular characteristic X - ray with the atomic number Z of the material is

A. 

B. 

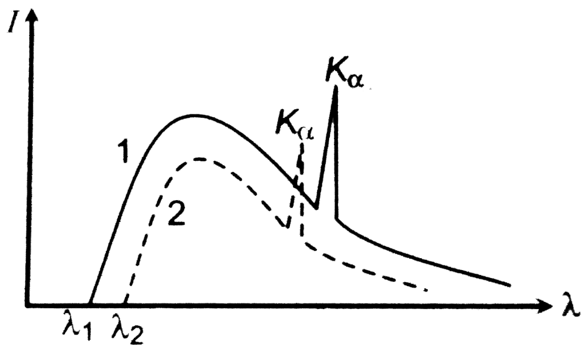
C. 

D. 

Answer: C

Watch Video Solution

424. The intensity distribution of X - rays from two Coolidge tubes operated on different voltages V_1 and V_2 and using is shown in the figure . Which one of the following inequalities is true ?



A. $V > V, Z < Z$

B. $V > V > Z > Z$

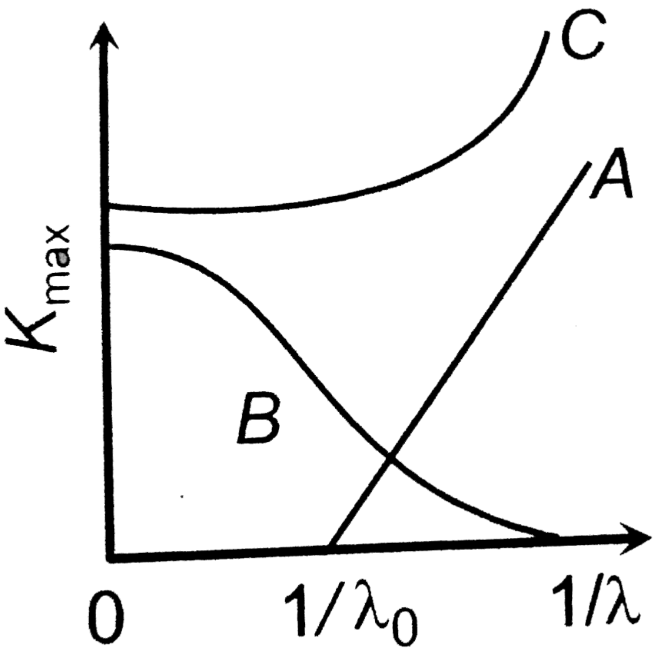
C. $V < V, Z > Z$

D. $V = Z, Z < Z$

Answer: A

Watch Video Solution

425. The correct graph between the maximum energy of a photoelectron and the inverse of wavelength of the incident radiation is given by the curve



A. A

B. B

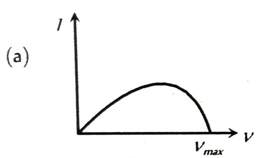
C. C

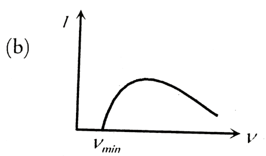
D. D

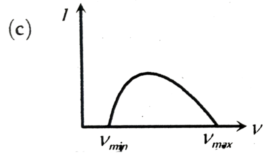
Answer: A

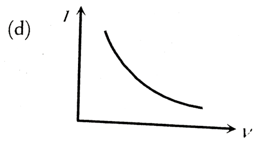
Watch Video Solution

426. The continuous x - ray spectrum obtained from a Coolidge tube is of the form

A. 

B. 

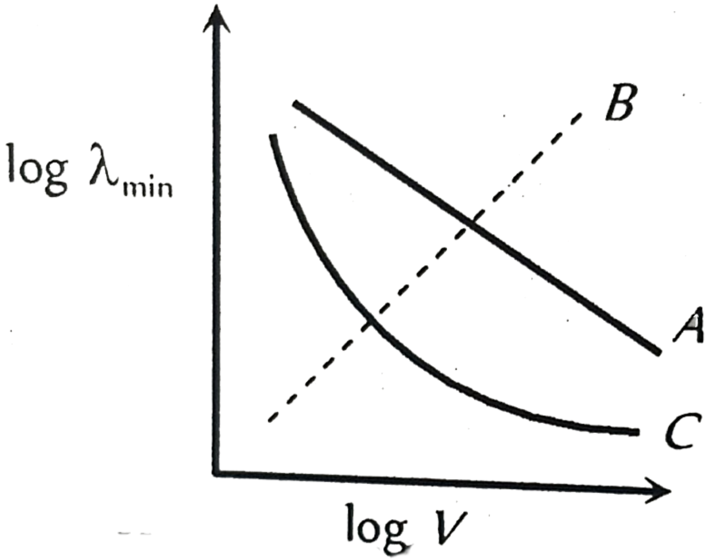
C. 

D. 

Answer: A

Watch Video Solution

427. The dependence of the short wavelength limit $\lambda_{\min}$ on the accelerating potential V is represented by the curve of figure



A. A

B. B

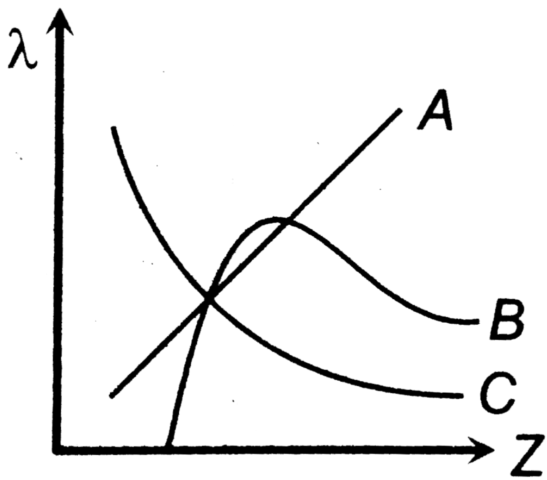
C. C

D. None of these

Answer: A

Watch Video Solution

428. The variation of wavelength λ of the K_{α} line with atomic number Z of the target is shown by the following curve of



A. A

B. B

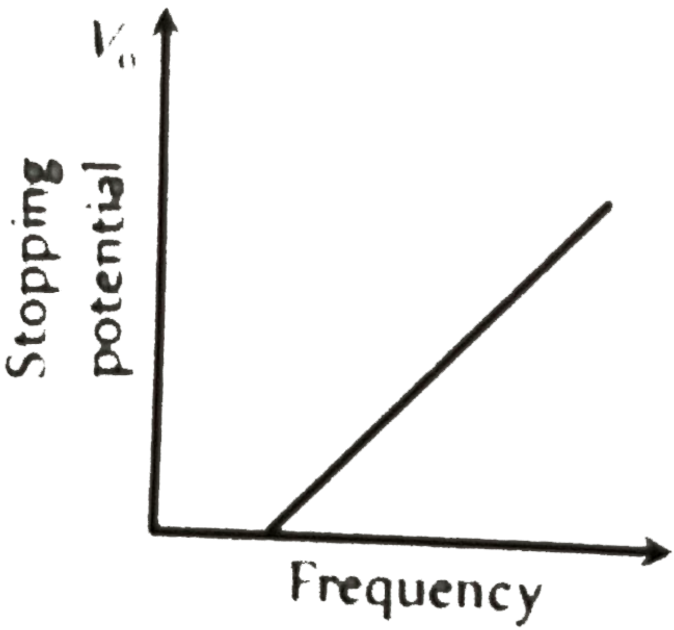
C. C

D. None of these

Answer: C

Watch Video Solution

429. In the graph given below. If the slop is $4.12 \times 10^{-15} V - \mathrm{sec}$, then value of 'h' should be



A. $6.6 \times 10^{-31} J - \mathrm{sec}$

B. $6.6 \times 10^{-34} J - \mathrm{sec}$

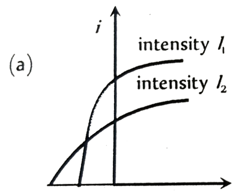
C. $9.1 \times 10 - 31 J - \mathrm{sec}$

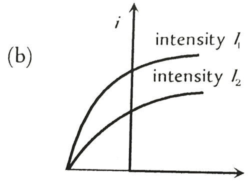
D. None of these

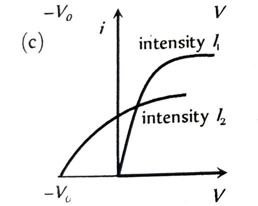
Answer: B

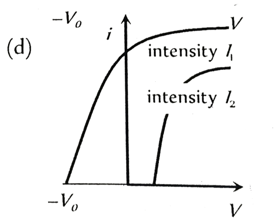
Watch Video Solution

430. The curves (a), (b), (c) and (d) show the variation between the applied potential difference (V) and the photoelectric current (i) , at two different intensities of light $(I_1 > I_2)$. In which figure is the correct variation shown ?

A. 

B. 

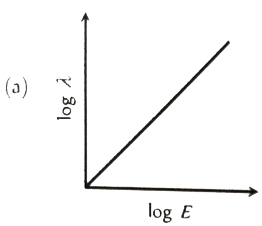
C. 

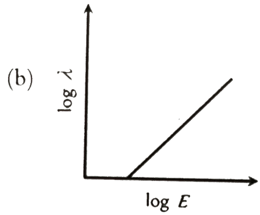
D. 

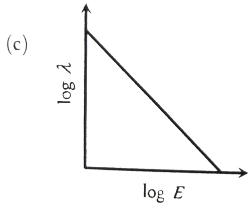
Answer: B

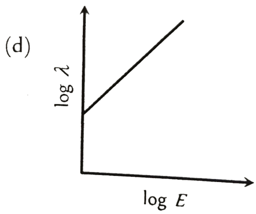
Watch Video Solution

431. The log - log graph between the energy E of an electron and its de - Broglie wavelength λ will be

A. 

B. 

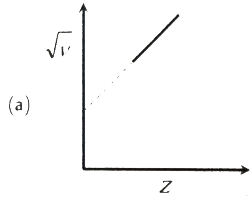
C. 

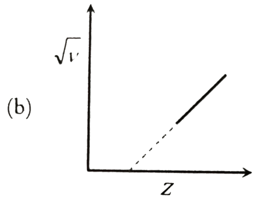
D. 

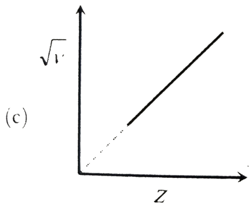
Answer: C

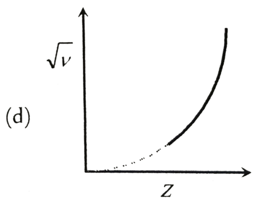
Watch Video Solution

432. The graph between the square root of the frequency of a specific line of characteristic spectrum of X - rays and the atomic number of the target will be

A. 

B. 

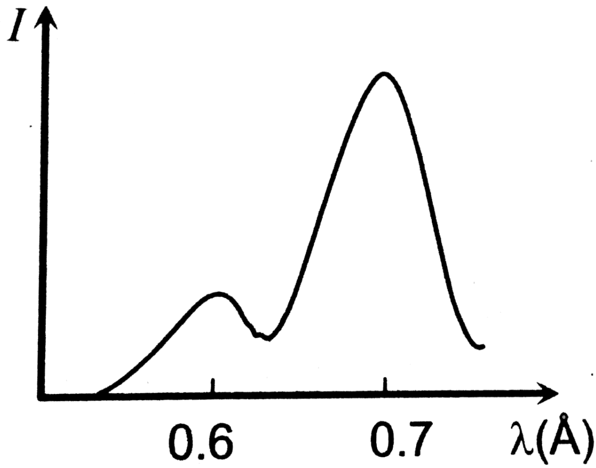
C. 

D. 

Answer: B

Watch Video Solution

433. In the diagram a graph between the intensity of X-rays emitted by a molybdenum target and the wavelength is shown , when electrons of $30 keV$ are incident on the target. In the graph one peak is of K_α line and the other peak is of K_β line



A. First peak is of K_α line at 0.6 Å

B. Highest peak is of K_α line at 0.7 Å

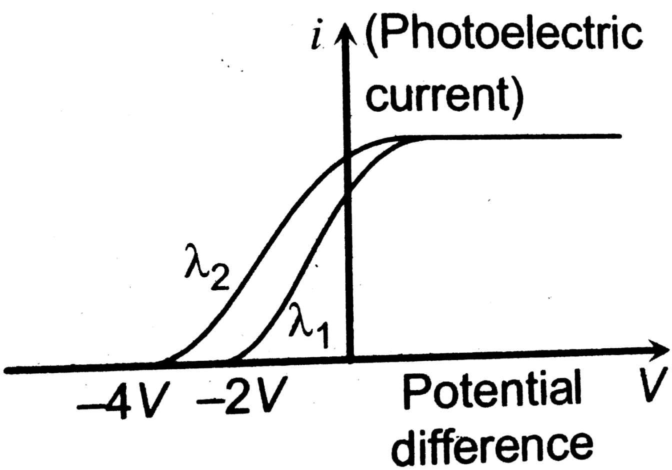
C. If the energy of incident particles is increased, then the peaks will shift towards left

D. If the energy of incident particles is increased, then the peaks will shift towards right

Answer: B

Watch Video Solution

434. The maximum value of stopping potential in the following diagram is



A. $-4V$

B. $-1V$

C. $-3V$

D. $-2V$

Answer: A

Watch Video Solution

435. The slope of frequency of incident light and stopping potential for a given surface will be

A. h

B. h/e

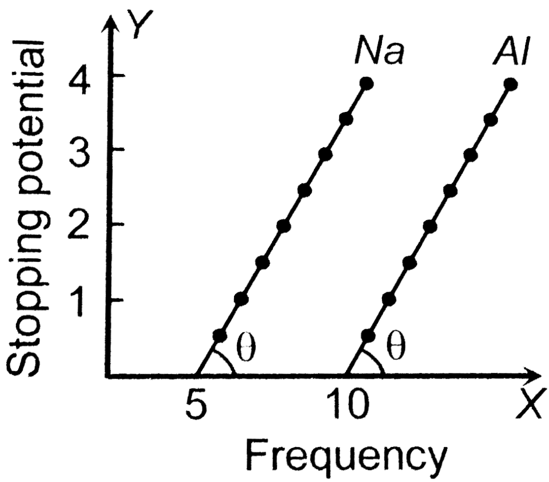
C. eh

D. e

Answer: B

Watch Video Solution

436. From the figure describing photoelectric effect we may infer correctly that



A. Na and Al both havethe same should frequency

B. Maximum kinetic energy for both the metals depend linearly on the frequency

C. The stopping potentials are different for Na and Al for the same change in frequency

D. Al is a better photo sensitive material than Na

Answer: B

Watch Video Solution

437. Assertion : The energy (E) and momentum (p) of a photon are related by $p = E / c$.

Reason : The photon behaves like a particle.

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: A

Watch Video Solution

438. Assertion : Photoelectric effect demonstrates the wave nature of light.

Reason: The number of photoelectrons is proportional to the frequency of light.

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: D

Watch Video Solution

439. Assertion : When the speed of an electron increases its specific charge decreases.

Reason : Specific charge is the ratio of the change to mass.

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: B

Watch Video Solution

440. Assertion : X - rays travel with the speed of light.

Reason : X- rays are electromagnetic rays.

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: A

Watch Video Solution

441. Assertion : Mass of moving photon varies inversely as the wavelength .

Reason : Energy of the particle $= Mass \times (Speedoflight)^2$

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: B

Watch Video Solution

442. Assertion : Kinetic energy of photo electrons emitted by a photosensitive surface depends upon the intensity of incident photon.

Reason : The ejection of electrons from metallic surface is possible with frequency of incident photon below the threshold frequency.

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: D

Watch Video Solution

443. Assertion: Isotopes of an element can be separated by using a mass spectrometer.

Reason: Separation of isotopes is possible because of difference in electron numbers of isotope.

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: D

Watch Video Solution

444. Assertion : The specific charge of positive rays is not constant.

Reason : The mass of ions varies with speed.

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: B

Watch Video Solution

445. Assertion : Photosensitivity of a metal is high if its work function is small.

Reason : Work function $= hf_0$ where f_0 is the threshold frequency.

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: B

Watch Video Solution

446. Assertion : The de - Broglie wavelength of a molecule varies inversely as the square root of temperature.

Reason : The root mean square velocity of the molecule depends on the temperature.

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: A

Watch Video Solution

447. Assertion : Light is produced in gases in the process of electric discharge through them at high pressure.

Reason : At high pressure electrons of gaseous atoms collide and reach excited state.

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: D

Watch Video Solution

448. Assertion : If different gases are filled turn by turn at the same pressure in the discharge tube the discharge in them takes place at the same potential.

Reason : The discharge depends only on the pressure of discharge tube and not on the ionisation potential of gas.

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: D

Watch Video Solution

449. Assertion : An electric field is preferred in comparison to magnetic field for detecting the electron beam in a television picture tube.

Reason : Electric field require low voltage.

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: D

Watch Video Solution

450. Assertion : The specific charge for positive rays is a characteristic constant.

Reason : The specific charge depends on charge and mass of positive ions present in positive rays .

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: B

Watch Video Solution

451. Assertion : In the process of photoelectric emission , all the emitted photoelectrons have the same kinetic energy.

Reason : The photon transfers its whole energy to the electron of the atom in photoelectric effect.

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: D

Watch Video Solution

452. Assertion : In photoelctric effect , on increasing the intensity of light , both the number of electrons emitted and kinetic energy of each of them get increased but photoelectric current remains unchanged.

Reason : The photoelectric current depends only on wavelength of light .

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: D

Watch Video Solution

453. Assertion : Though light of a single frequency (monochromatic) is incident on a metal , the energies of emitted photoelectrons are different.

Reason : The energy of electrons emitted from inside the metal surface is lost in collision with the other atoms in the metal.

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: A

Watch Video Solution

454. Assertion : The threshold frequency of photoelectric effect supports the particle nature of sunlight .

Reason : If frequency of incident light is less than the threshold frequency , electrons are not emitted from metal surface.

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: B

Watch Video Solution

455. Assertion : In photoemissive cell inert gas is used.

Reason : Inert gas in the photoemissive cell gives greater current.

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: A

Watch Video Solution

456. Assertion : X - rays cannot be diffracted by means of grating

.

Reason : X - rays does not obey Bragg's law.

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: C

Watch Video Solution

457. Assertion : X - rays can penetrate through the flesh but not through the bones.

Reason : The penetrating power of X - rays depends on voltage.

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: B

Watch Video Solution

458. Assertion : Intensity of X - rays can be controlled by adjusting the filament current and voltage.

Reason : The intensity of X - ray does not depends on number of X-ray photons emitted per second from the target.

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: C

Watch Video Solution

459. Assertion : Anode of Coolidge tube gets heated up at time of emission of X - rays .

Reason : The anode of Coolidge tube is made of a material of high melting point.

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: B

Watch Video Solution

460. Assertion : Soft and hard X-rays differ in frequency as well as velocity.

Reason : The penetrating power of hard X- rays is more than the penetrating power of soft X-rays.

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: D

Watch Video Solution

461. Assertiion : X - rays are used for studying the structure of crystals.

Reason : The distance between the atoms of crystals is of the order of wavelength of X - rays.

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: A

Watch Video Solution

462. Assertion : The phenomenon of X - ray production is basically inverse of photoelectric effect.

Reason : X - rays are electromagnetic waves.

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: B

Watch Video Solution

463. Assertion : Soft and hard X-rays differ in frequency as well as velocity.

Reason : The penetrating power of hard X- rays is more than the penetrating power of soft X-rays.

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: D

Watch Video Solution

464. Which of the following has the least value of $\frac{q}{m}$?

A. Electron

B. Proton

C. α − particles

D. $\beta -$ partices

Answer: C

Watch Video Solution

465. When green light is incident on the surface of metal , it emits photo - electrons but there is no such emission with yellow colour light. Which one of the colours can produce emission of photo - electrons ?

A. Orange

B. Red

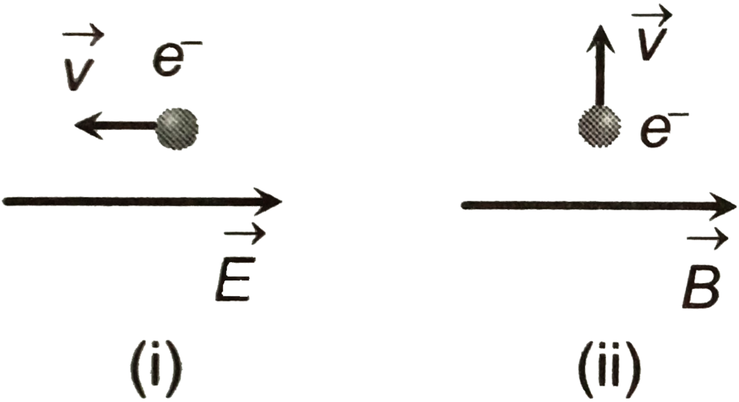
C. Indigo

D. None of the above

Answer: C

Watch Video Solution

466. An electron is moving through a field. It is moving (i) opposite an electric field (ii) perpendicular to a magnetic field as shown. For each situation the de - Broglie wave length of electron



A. Increasing, increasing

B. Increasing, decreasing

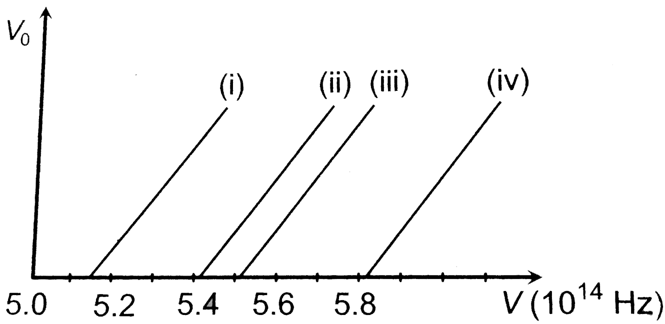
C. Decreasing, same

D. Same, Same

Answer: C

Watch Video Solution

467. The figure shows different graphs between stopping potential (V_0) and frequency (v) for photosensitive surface of cesium , potassium , sodium and lithium. The plots are parallel. Correct ranking of the targets according to their work function greatest forst will be



A. (i) gt (ii) gt (iii) gt (iv)

B. (i) gt (iii) gt (ii) gt (iv)

C. (iv) gt (iii) gt (ii) lt (i)

D. (i) = (iii) gt (ii) = (iv)

Answer: C

Watch Video Solution

468. The K_{α} X - rays arising from a cobalt $(z = 27)$ target have a wavelength of $179 \pm$. The K_{α} X - rays arising from a nickel target $(z = 28)$ is

A. > 179 pm

B. < 179 pm

C. $= 179$ pm

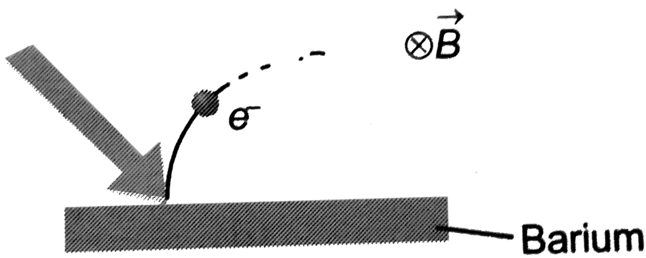
D. None of these

Answer: B

Watch Video Solution

469. Light of wavelength 2475Å is incident on barium. Photoelectrons emitted describe a circle of radius $100 cm$ by a magnetic field of flux density $\frac{1}{\sqrt{17}} \times 10^{-5} Tesla.$

Work function of the barium is (Given $\frac{e}{m} = 1.7 \times 10^{11}$)



A. 1.8 eV

B. 2.1 eV

C. 4.5 eV

D. 3.3 eV

Answer: C

Watch Video Solution

470. Five elements A, B, C, D and E have work functions $1.2eV, 2.4eV, 3.6eV, 4.8eV$ and $6eV$ respectively . If light of wavelength 4000Å is allowed to fall on these elements , then photoelectrons are emitted by

A. A,B and C

B. A,B,C,D and E

C. A and B

D. Only E

Answer: C

Watch Video Solution

471. If light of wavelength λ_1 is allowed to fall on a metal , then kinetic energy of photoelectrons emitted is E_1. If wavelength of light changes to λ_2 then kinetic energy of electrons changes to E_2. Then work function of the metal is

A. $\dfrac{E_1E_2(\lambda_1-\lambda_2)}{\lambda_1\lambda_2}$

B. $\dfrac{E_1\lambda_1-E_2\lambda_2}{(\lambda_1-\lambda_2)}$

C. $\dfrac{E_1\lambda_1-E_2\lambda_2}{(\lambda_2-\lambda_1)}$

D. $\dfrac{\lambda_1\lambda_2E_1E_2}{(\lambda_2-\lambda_1)}$

Answer: C

Watch Video Solution

472. If maximum velocity with which an electron can be emitted from a photo cell is $4 \times 10^8 cm / \sec$, the stopping potential is (mass of electron $= 9 \times \; - 31kg$)

A. 30 volt

B. 45 volt

C. 59 volt

D. Information is insufficient

Answer: B

Watch Video Solution

473. Three particles having their changes in the ratio of $1:3:5$ produce the same spot on the screen in Thomson's experiment . Their respective masses are in the ratio of

A. $5:3:1$

B. $3:1:5$

C. $1:3:5$

D. $5:1:3$

Answer: C

Watch Video Solution

474. If the momentum of an electron is changed by Δp , then the de - Broglie wavelength associated with it changes by $0.50\ \%$. The initial momentum of the electron will be

A. $\frac{\Delta p}{200}$

B. $\frac{\Delta p}{199}$

C. $199\Delta p$

D. $400\Delta p$

Answer: C

Watch Video Solution

475. A potential of 10000 V is applied across an x-ray tube. Find the ratio of de-Broglie wavelength associated with incident electrons to the minimum wavelength associated with x-rays.

A. 1

B. 0.1

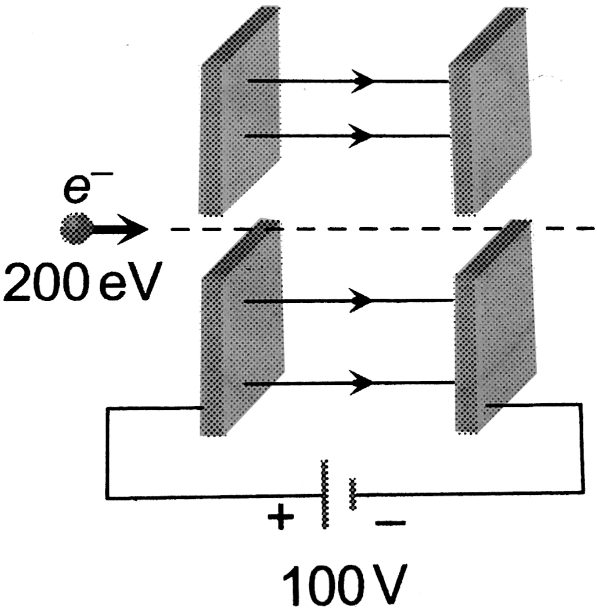
C. 0.2

D. 0.3

Answer: B

Watch Video Solution

476. Two large parallel plates are connected with the terminal of $100V$ power supply. These plates have a fine hole at the centre . An electron having energy $200eV$ is so directed that it passes through the holes . When it comes out its de - Broglie wavelength is



A. 1.22 Å

B. 1.75 Å

C. 2 Å

D. None of these

Answer: A

Watch Video Solution

477. According to Bohr's theory , the electron in orbits have definite energy values , then according to uncertainty principle , the life of an excited state will be

A. Zero

B. Finite

C. 10 sec

D. Infinite

Answer: D

Watch Video Solution

478. Monochromatic light of wavelength 3000Å is incident on a surface area $4cm^2$. If intensity of light is $150mW/m^2$, then rate at which photons strike the target is

A. $3 \times 10/\sec$

B. $9 \times 10/\sec$

C. $7 \times 10/\sec$

D. $6 \times 10/\sec$

Answer: B

Watch Video Solution

479. For characteristic X - ray of some material

A. $E(K_{\gamma}) < E(K_{\beta}) < E(K_{\alpha})$

B. $E(K_{\alpha}) < E(L_{\alpha}) < E(M_{\alpha})$

C. $\lambda(K_{\gamma}) < \lambda(K_{\beta}) < \lambda(K_{\alpha})$

D. $\lambda(M_{\alpha}) < \lambda(L_{\alpha}) < \lambda(K_{\alpha})$

Answer: C

Watch Video Solution

480. The maximum velocity of electrons emitted from a metal surface is v. What would be the maximum velocity if the frequency of incident lightis increased by a factor of 4?

A. 2 V

B. $> 2V$

C. $< 2V$

D. Between 2 V and 4 V

Answer: B

Watch Video Solution

Cathode Rays and Positive Rays

1. The cathode rays have particle nature because of the fact that

A. They can propagate in vacuum

B. They are deflected by electric and magnetic fields

C. They produced flurescence

D. They cast shadows

Answer: B

View Text Solution

View Text Solution

2. In Millikan's experiment for the determination of the charge on the electron, the reason for using the oil is

A. It is a lubricant

B. its density is higher

C. it vapourises easily

D. it does not vapourise

Answer: D

View Text Solution

3. When electron beam passes through an electric field,they gain kinetic energy. If the same beam passes through magnetic field, then

A. Their energy increases

B. Their momentum increases

C. Their potential energy increases

D. Energy and momentum both remains unchanged

Answer: D

View Text Solution

4. Which of the following law is used in the Millikan's method for the determination of charge

A. Ampere's law

B. Stoke's law

C. Fleming's left hund rule

D. Fleming's right hund rule

Answer: B

View Text Solution

5. The mass of the electron varies with

A. The size of the cathode ray tube

B. The variation of 'g'

C. Velocity

D. Size of the electron

Answer: C

View Text Solution

6. When the speed of electrons increases, then the value of its specific charge

A. Increases

B. Decreases

C. Remails unchanged

D. Increases upto some velocity and then begins to decrease

Answer: B

View Text Solution

7. An electron is accelerated through a potential difference of 1000 volts .Its velocity is nearly

A. $3.8 \times 10^7 m/s$

B. $1.9 \times 10^6 m / s$

C. $1.9 \times 10^7 m / s$

D. $5.7 \times 10^7 m / s$

Answer: C

View Text Solution

8. Which one of the following devices makes use of the electrons to strike certain substances to produce flurescence

A. Thermionic valve

B. Photoelectric cell

C. Cathode ray oscilloscope

D. Electron gun

Answer: C

View Text Solution

9. An oxide coated filament is useful in vacuum tubes because essentially

A. It has high melting point

B. It can withstand high temperatures

C. It has good machanical strength

D. It can emit electrons at relatively lower temperatures

Answer: D

View Text Solution

10. Cathode rays and canal rays produced in a certain discharge tube are deflected in the same direction if

A. A magnetic field is applied normally

B. An electric field is applied normally

C. An electric field is applied tangentially

D. A magnetic field is applied tangentially

Answer: A

View Text Solution

11. Cathode rays are produced when the pressure is of the order of

A. 2cm of Hg

B. 0.1 cm of Hg

C. 0.01 mm of Hg

D. $1\mu m$ of Hg

Answer: C

View Text Solution

Photon and Photoelectric Effect

1. The momentum of a photon of energy hv will be

A. hv

B. hv/c

C. hvc

D. h/v

Answer: B

View Text Solution

2. The energy of a photon of light of wavelength 66 eV is

A. 4.4×10^{-19}

B. $2.5 \times 10^{-19} J$

C. $1.25 \times 10^{-17} J$

D. $2.5 \times 10^{-17} J$

Answer: A

View Text Solution

3. Which of the following is true for photon

A. $E = \frac{hc}{\lambda}$

B. $E = \frac{1}{2}mu^2$

C. $p = \frac{E}{2v}$

D. $E = \frac{1}{2}mc^2$

Answer: A

View Text Solution

4. In a photo cell, the photo-electrons emission takes place

A. After 10 sec on incident of light rays

B. After 10 sec on incident of light rays

C. After 10 sec on incident of light rays

D. After 10 sec on incident of light rays

Answer: D

View Text Solution

Critical Thinking

1. Rest mass energy of an electron is 0.51 MeV. If this electron is moving with a velocity 0.8 c (where c is velocity of light in vacuum), then kinetic energy of the electron should be.

A. 0.28 MeV

B. 0.34 MeV

C. 0.39 MeV

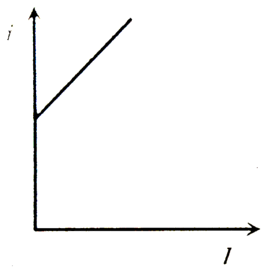
D. 0.46 MeV

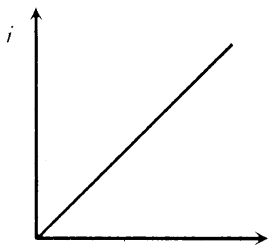
Answer: B

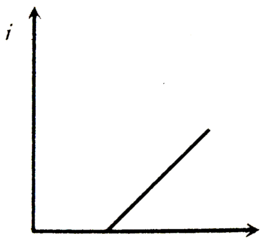
View Text Solution

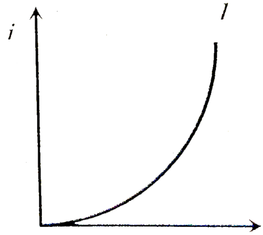
Graphical Question

1. The graph between intensity of light falling on a metallic plate (I) with the current (i) generated is

A. 

B. 

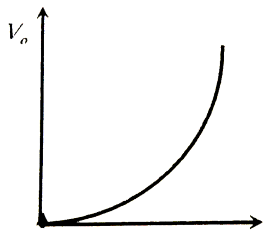
C. 

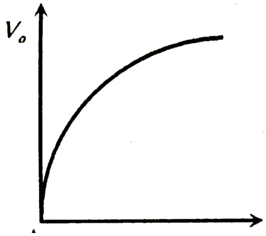
D. 

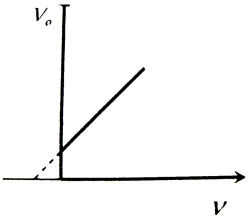
Answer: B

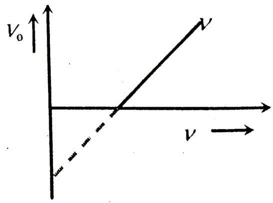
View Text Solution

2. For a photoelectric cell the graph showing the variation of cut of voltage (V) with frequency (v) of incident light is best represented by

A. 

B. 

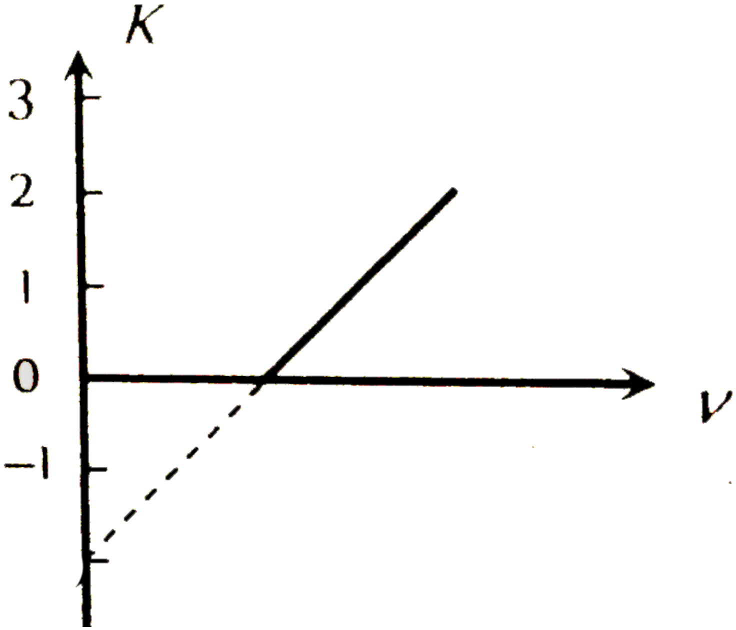
C. 

D. 

Answer: D

View Text Solution

3. Figure represents a graph of kinetic energy (K) of photoelectrons (in eV) and frequency (v) for a metal used as cathode in photoelectric experiment. The work function of metal is



A. 1 eV

B. 1.5 eV

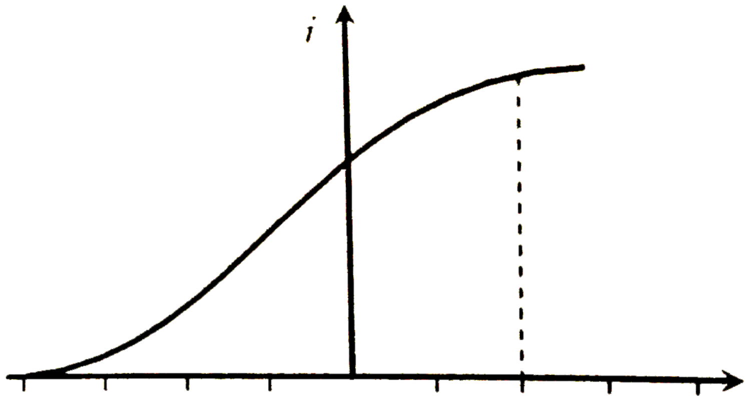
C. 2 eV

D. 3 eV

Answer: C

View Text Solution

4. Figure represents the graph of photo current I versus applied voltage (V). The minimum energy of emitted photoelectrons is



A. 2 eV

B. 4 eV

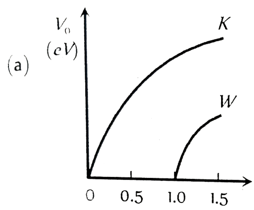
C. 0 eV

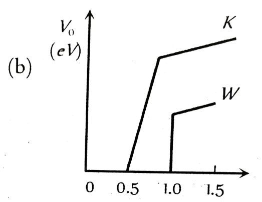
D. 4 J

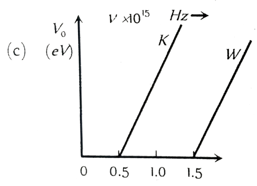
Answer: B

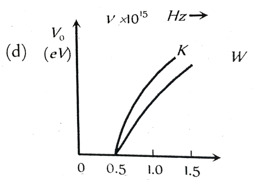
View Text Solution

5. The figure showing the correct relationship between the stopping potential V and the frequency v of the light for potassium and tungsten is

A. 

B. 

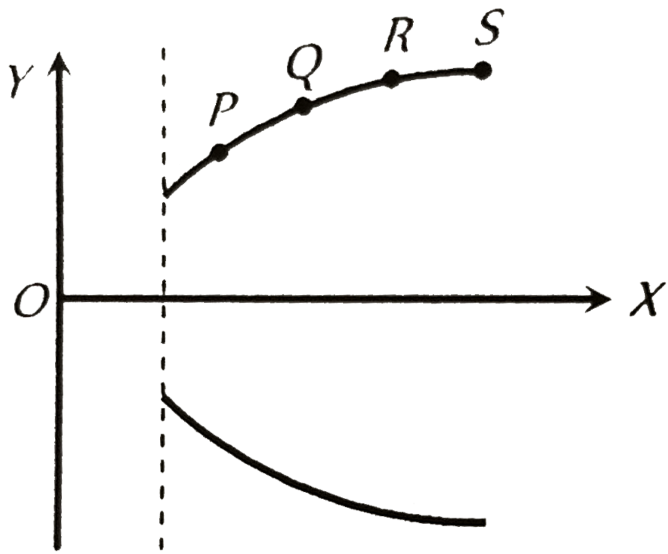
C. 

D. 

Answer: C

View Text Solution

6. In a parabola spectrograph, the velocities of four positive ions P,Q,R and S are v_1, v_2, v_3 and v_4 respectively



A. $v_1 > v_2 > v_3 > v_4$

B. $v_1 < v_2 < v_3 < v_4$

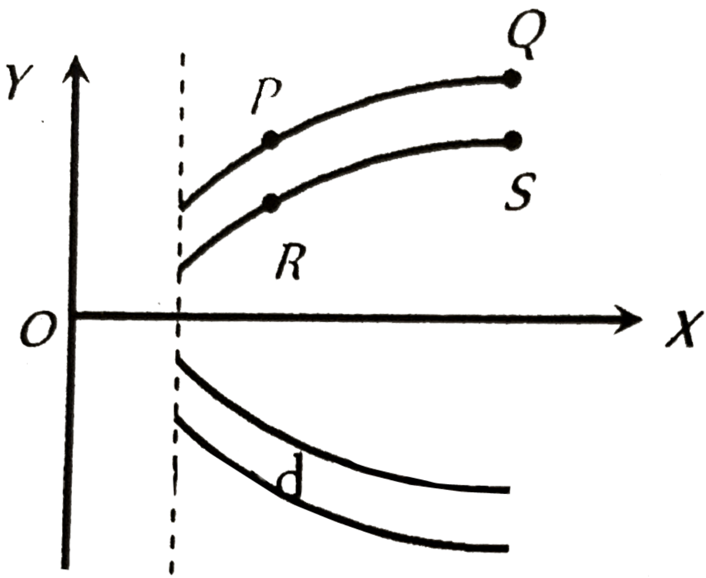
C. $v_1 = v_2 = v_3 = v_4$

D. $v_1 < \; < v_2 > v_3 < v_4$

Answer: A

View Text Solution

7. In Thomson spectrograph experiment, four positive ions P,Q,R and S are situated on Y-X curve a shown in the figure



A. The specific charge of R and S are same

B. The masses of P and S are same

C. The specific charges of Q and R are same

D. The velocities of R and S are same

Answer: A

View Text Solution

Assertion & Reason

1. Assertion : An electron is not deflected on passing through certain region of space. This observation confirms that there is no magnetic field in that region.

Reason : The deflection of electron depends on angle between velocity of electron and direction of magnetic field

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: D

View Text Solution

2. Assertion : Electric conduction in gases is possible at normal pressure.

Reason : The electric conduction in gases depends only upon the potential difference between the electrodes.

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: D

View Text Solution

3. Assertion : In Millikan's experiment for the determination of charge on an electron, oil drops of any size can be used.

Reason : Millikan's experiment determine the charge on electron, by simply measuring the terminal velocity

A. If both assertion and reason are true and the reason is the correct explanation of the assert ion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: D

View Text Solution

Self Evaluation Test

1. If a voltage to an X-ray tube is increased to 1.5 times the minimum wavelength $(\lambda_{\min})$ of an X-ray continuous spectrum shifts by $\Delta\lambda = 26$ pm. The initial voltage applied to the tube is

A. $\approx 10kV$

B. $\approx 16kV$

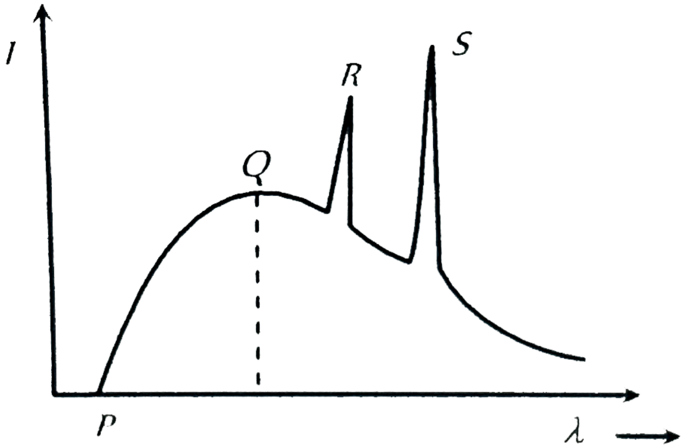
C. $\approx 50kV$

D. $\approx 75kV$

Answer: B

View Text Solution

2. If the potential difference between the anode and cathode of the X-ray tube is increases



A. The peaks at R and S would move to shorter wavelength

B. The peaks at R and S would remain at the same wavelength

C. The cut off wavelength at P would decrease

D. (b) and (c) both are correct

Answer: D

View Text Solution

3. The collector plate in an experiment on photoelectric effect is kept vertically above the emitter plate. Light source is put on and a saturation photo current is recorded. An electric field is switched on which has a vertically downward direction

A. The photo current will increase

B. The kinetic energy of the electrons will increase

C. The stopping potential will decrease

D. The threshold wavelength will increase

Answer: B

View Text Solution