

QAD session on Modern Physics

1. The band gap energy of silicon is 1.104 eV. The wavelength equivalent to this energy is
a. 10048 A⁰ b. 11243 A⁰ c. 12092 A⁰ d. 13132 A⁰
2. Which of the following is universal gate?
a. OR b. NAND c. NOR d. Both b and c
3. The binding energy per nucleon in $^{15}\text{P}^{31}$ nucleus is
(Mass of $^{15}\text{P}^{31}$ = 30.97376 amu, Mass of $^0\text{n}^1$ = 1.00865 amu and Mass of $^1\text{H}^1$ = 1.00782 amu)
a. 9.82 MeV b. 8.46 MeV c. 6.42 MeV d. 4.48 MeV
4. The half life of a radioactive element is 40 minutes. The time interval between 20% decay and 80% decay will be
a. 20 min b. 40 min c. 60 min d. 80 min
5. Which of the following is not equal to 1 in Boolean algebra?
a. A + 1 b. A + Abar c. A.Abar d. Complement of A.Abar
6. Two NOT gates are connected at two inputs of a NAND gate. This combination will behave as ...gate.
a. OR b. NAND c. AND d. NOR
7. In hydrogen atom, an electron is revolving in 3rd orbit. The momentum of electron is ...kg m/sec.
A. 3.15×10^{-34} b. 6.63×10^{-34} c. 6.60×10^{-25} d. 1.38×10^{-24}
8. Two photons of energy 2.5 eV and 5 eV are incident on a metal whose work function is 0.5 eV. The ratio of maximum velocity of emitted photo electrons in these two cases will be
a. 1:1 b. 1:2 c. 2:3 d. 1:3
9. Work function of a metal surface depends upon
a. Frequency of incident photon
b. Wavelength of incident photon
c. Both a and b
d. Nature of metal surface
10. The angular velocity of electron revolving in nth orbit is proportional to
a. n b. 1/n c. n^3 d. n^{-3}
11. The stopping potential of emitted electron is plotted along y-axis and frequency of incident photon is plotted along x-axis. The slope of graph gives
a. h b. w c. h/e d. e/h
12. When x-ray tube is operated at 62 KV, the wavelength of x-ray produced is 10 A⁰. The approximate efficiency of x-ray production is%.
a. 1 b. 1.5 c. 2 d. 2.5
13. The reason for using clock oil in Millikan oil drop experiment is
a. Its density is high
b. It gets charged due to friction
c. It does not vaporize
d. All of above
14. Which one can not be deflected in electric and magnetic field?
a. Cathode ray b. x-ray c. gamma ray d. photon
15. Which of the following statement is correct?

I. Cathode rays has velocity in the range of 1/30 to 1/10 of speed of light

II. Lead is the best absorber of x-rays

- a. I
- b. II
- c. both
- d. none

16. If an electron enters into a space between the plates of parallel plates capacitor at an angle α and leaves at an angle β to the plates. The ratio of kinetic energy while entering the capacitor to that while leaving will be :

$$\frac{A. \cos^2\alpha/\cos^2\beta}{B. \sin^2\alpha/\sin^2\beta} \quad C. \cos^2\beta/\cos^2\alpha \quad D. \sin^2\beta/\sin^2\alpha$$

17. when PN junction divide is forward biased and then reverse biased, the flow of current is mainly due to:

- A. Drift velocity in first case and diffusion of electrons in 2nd case.
- B. Diffusion of electrons in first case and drift velocity in 2nd case.
- C. Drift velocity in both cases.
- D. Diffusion of electrons in both cases.

18. The threshold frequency of a metal is f_0 when the frequency of incident light is $2f_0$, photo-electrons are emitted with maximum velocity of 4×10^6 m/s. the maximum velocity of emitted electrons when frequency of incident photon fall on it is $5 f_0$:

- A. 8×10^6 m/s
- b. 2×10^6 m/s
- c. 0
- d. 16×10^6 m/s