

KVPY INTERVIEW)_(PHYSICS)

1. What are the orders of drift velocity for normally applied potentials (0 to 5V) and that of random thermal speed at room temperature say (300 K).

Ans. The drift velocity is of the order of 10m per second whereas random thermal velocity of electrons is of the order of 10^5 metre per second.

2. What is the conventional direction of flow of current in a metallic conductor ?

Ans. The conventional direction of flow of current is taken as the direction of flow of positive charge from higher potential to lower potential.

3. What is meant by ampere hour capacity of a cell ?

Ans. It is a measure of the electricity capacity of a cell, i.e., how much quantity of electricity, a cell is capable of supplying. It is measured by the product amperes x hours.

4. What do you mean by $10\text{ A} \times \text{h}$?

Ans. $10\text{ A} \times \text{h}$ means, the cell will supply 1 A current upto 10 hours. 2 A current upto 5 hours or 0.5 A current upto 20 hours.

5. Which one is greater e.m.f. or terminal voltage across the cell ?

Ans. The e.m.f. is greater than the terminal voltage across the cell

6. Is it possible in any case where p.d. > e.m.f. of the cell ?

Ans. Yes, at the time of charging of the cell

7. Can you measure e.m.f. of a cell with a voltmeter ?

Ans. No, because it requires some current from the cell for its reading. (it is measured by potentiometer)

8. When is the Wheatstone's bridge said to be most sensitive ?

Ans. When all the four resistances P, Q, R and S are of nearly the same order of magnitude.

9. Define figure of merit of galvanometer ?

Ans. The figure of merit which is defined as the current required to produce a deflection of one division in the galvanometer. ($k = I/\theta$).

10. Define current sensitivity and voltage sensitivity.

Ans. Current sensitivity = θ/I and voltage sensitivity = θ/V

11. How can you measure alternating current ?

Ans. Heating effect of current, $Q = I^2Rt$ is independent of the direction of flow of current because I^2 would always be positive. Therefore, Hot Wire ammeter is used for this purpose.

12. Suppose you have been given two tuning forks of the same metal on which marks of the frequency have disappeared. How will you detect the one with higher frequency ?

Ans. The one which has smaller prongs will be of higher frequency.

13. What do you mean by a note ? How does it differ from a tone ?

Ans. A tone is simple sound resulting from a pure simple harmonic motion. On the other hand a note is a complex sound made up of a complex periodic motion as obtained by the superpositions of a number of pure simple harmonic motions.

14. If the prongs of a fork are rubbed with a file slightly or prong of tuning fork is loaded with wax than what will be the change in frequency in both the cases.

Ans. Frequency will decrease in both the cases.

15. If you set your watch by the sound of a distant siren, will it go fast or slow ?

Ans. go slow, [because, sound takes some finite time to reach you]

16. When we start filling an empty bucket with water the pitch of the sound produced goes on changing, why ?

Ans. Bucket used like a closed pipe

$$\text{fundamental tone, } v = \frac{u}{4L} \quad v \propto \frac{1}{L}$$

So, L decreases, then v increases and pitch is also increased

17 A tunnel is drilled across earth passing through the centre. An object is dropped in this tunnel. What will be the time period of this object.

Ans. It will oscillate about the centre of earth, its time period will be

$$T = 2\pi\sqrt{\frac{R}{g}} = 86.4 \text{ minute}$$

18. If tunnel is drilled across the earth and it does not pass through the centre of earth, then what will be its time period ?

Ans. $T = 2\pi\sqrt{\frac{R}{g}} = 86.4 \text{ minute}$

19. Time period of a simple pendulum $T \propto \sqrt{\ell}$. If we increase the length (ℓ) of the pendulum then what will be the maximum time period ?

Ans. $T = 2\pi\sqrt{\frac{R}{g}} = 86.4 \text{ minute}$

20. the ball of a pendulum is hollow and filled with water. A small hole is made in the bottom of the ball, water comes out from it. How the time period of pendulum will effect.

Ans. First it will increase then decrease.

21. If we increase the current drawn from the cell then what will be the effect on potential difference across the cell ?

Ans. $V = E - Ir$, it will decrease

22. A car is moving towards north direction with speed V . What will be the induced emf in the axle of the car?

Ans. (i) V is towards north emf induced due to B_H So, $e = \ell \hat{i} \cdot (\vec{v} \times B_H \hat{j}) = 0$

emf induced due to B_V , $e = \ell \hat{i} \cdot [\vec{v} \times (-B_V \hat{k})] = -B_V \ell v$

23. What are soft and hard x-rays ? Why are they so called ?

Ans. 0.1 to 1 Å hard x-rays, 1 to 10 Å soft x-rays

24. On which experiment Kepler's laws are based ?

Ans. Tycho brahe's experiments

25. If the earth is at one-fourth of its present distance from the sun, then what will be the duration of year ?

Ans. 1/8 the present year

Sol. $T \propto (r)^{3/2} \Rightarrow T = \left(\frac{1}{4}\right)^{3/2} = \frac{1}{8}$

26. Who was the first to introduce MKS system ?

Ans. Giorgi

27. A liquid boils at a temperature of which its saturated vapour pressure becomes ?

Ans. Equal to the atmospheric pressure.

28. What will be the value of C in an adiabatic change for a monatomic gas $P \propto T^C$?

Ans. $P^{1-\gamma} \propto T^\gamma$ or $\Rightarrow P \propto T^{(\gamma/(1-\gamma))}$

$$\therefore P \propto T^C, \text{ so } C = \frac{5/3}{1 - \frac{5}{3}} = 5/2$$

29. What will be kinetic energy of molecules of 1g He gas at 100°C ?

Ans. 1200 joule

30. A particle of charge $+q$ is dropped from rest above a height 'h' from the surface of a uniformly charged sphere of charge $+Q$ and radius R . When will be the particle hit the surface of the sphere ?

Ans. Particle will hit the surface only if h is large enough.

31. If a piece of iron is wound around by a coil and an AC current is passed, it gets hot. Why ?

Ans. Due to eddy current and hysteresis loss (Hysteresis and Eddy current if the frequency is slow).

32. A mercury barometer is surrounded by a big cylinder. What happens to the level of mercury, if air is slowly removed from the cylinder ?

Ans. Steadily falls.

33. A solid cylinder of diameter D is mounted on a frictionless horizontal axle. A string is wrapped around it. A heavy mass suspended by the string strikes the ground with a velocity V . How V depends on D ?

Ans. V is independent of D

- 34.** Water rises to a height of 1.25 cm in a particular capillary tube. If the tube is cut at a height of 1.0 cm. What will happen to the level of water ?
- Ans.** Water will stay at the top
- 35.** Optical fibres make light travel along curved lines by. How ?
- Ans.** using multiple total internal reflection.
- 36.** If a prism is cut into two pieces and separated at very small distance then, what will be the change in angle of deviation ?
- Ans.** Will always remain the same
- 37.** An observer looks at a tree of height 15m with a telescope of magnifying power 10. At what distance the tree will appear to him ?
- Ans.** 10 times nearer
- 38.** If radium and chlorine combine to form radium chloride the compound will be radioactive or not.
- Ans.** As radioactive as the radium content.
- 39.** An ice cube is suspended in vacuum in a gravity free room. What will be the shape of ice cube after some time ?
- Ans.** Ice will be in spherical shape
- 40.** What will be the dimensions of radiation pressure in case of an electromagnetic wave ?
- Sol.** $\frac{\text{Force}}{\text{Area}} = \frac{\text{Force} \times \text{Displacement}}{\text{Area} \times \text{Displacement}} = \frac{\text{Energy}}{\text{Volume}}$
- 41.** What is the common name of 'h' used in the formula $R = \frac{\ell^2}{6h} + \frac{h}{2}$
- Ans.** It is called sagitta
- 42.** What is the difference between a clock and a watch ?
- Ans.** Clock has big size its least count is 1 second. Watch has smaller size its least count is 0.1s/0.25s

43. The planets whose orbits are smaller than that of the earth are called ?

Ans. Inferior planets

44. Which is lighter, moist air or dry air ?

Ans. moist air—(dry air + water vapour)

45. What is hoar frost ?

Ans. Change of the substance from gaseous state to solid state without changing into liquid state is known as hoar frost.

46. Which one is better to measure potential difference of a resistance voltmeter or potentiometer ?

Ans. potentiometer

47. What is the resistance of an ideal ammeter ?

Ans. zero

48. What is the resistance of an ideal potentiometer ?

Ans. Infinity

49. Why galvanometer is not used usually to measure current in circuit ?

Ans. Because of high resistance.

50. How a galvanometer can be converted into ammeter ?

Ans. By joining a very small resistance in parallel to galvanometer.

51. How a galvanometer can be converted into voltmeter ?

Ans. By joining a very high resistance in series to galvanometer.

52. On what principle galvanometer works ?

Ans. Magnetic effect of current.

53. How a voltmeter is connected in circuit to measure potential difference ?

Ans. In parallel to the resistance.

54. How a ammeter is connected in circuit to measure potential difference ?

Ans. In series to the resistance.

55. On what principle meterbridge and potentiometer

Ans. Wheat stone bridge.

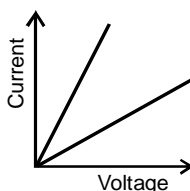
56. Why potentiometer is preferred over a volt meter.

Ans. As it does not draw any current from the circuit.

57. What are the ohmic and nonohmic conductor

Ans. The conductors which follow ohm's law are ohmic conductors.

58. The current in a metallic conductor is plotted against voltage at two different temperatures T_1 and T_2 . Which temperature is higher in T_1 and T_2 ?



Ans. $T_1 < T_2$

59. By mistake, a voltmeter is placed in series and an ammeter is parallel with a resistance in an electric circuit with a cell in series. If devices are ideal than what will be the reading of ammeter ?

Ans. Zero

60. What will be the reading of voltmeter in above question ?

Ans. emf of the cell

61. What is the resistance of an ideal diode in forward bias ?

Ans. Zero

62. What is the resistance of an ideal diode in reverse bias ?

Ans. Infinity

63. What type of doping is used to make p type semiconductor ?

Ans. Trivalent impurity

64. What type of doping is used to make n type semiconductor ?

Ans. Pentavalent impurity