

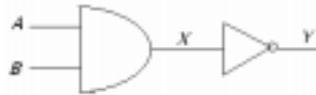
Physics Sample Paper

Class-XII

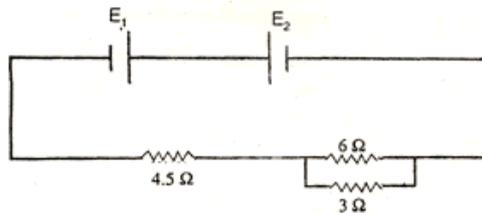
M.M.-70

Special Instructions: 1. Attempt all the questions in neat and beautiful handwriting with proper presentation.
2. Avoid overwriting and scribbling

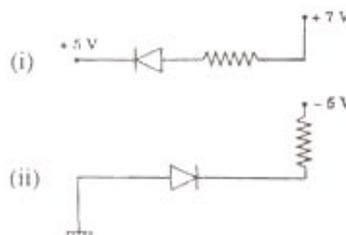
1. In which direction does the electric potential decrease in a uniform electrostatic field? 1
2. The vertical component of Earth's magnetic field at a place is $\sqrt{3}$ times the horizontal component. What is the value of angle of dip at this place? 1
3. The instantaneous voltage from an a.c source is given by $E = 300 \sin 314t$. What is the r.m.s voltage of the source? 1
4. What is the range of frequencies used for TV transmission? 1
5. What is the focal length of a plane mirror? 1
6. Give the difference between electron and a beta particle. 1
7. Draw energy band diagram for a p-type semiconductor. 1
8. Write the truth table for the combination of gates shown below. 1



9. A parallel plate capacitor with air between the plates has a capacitance of 8 pF. The separation between the plates is now reduced by half and the space between them is filled with a medium of dielectric constant 5. Calculate the value of capacitance of the capacitor in the second case. 2
10. Write the mathematical relation between mobility and drift velocity of charge carriers in a conductor. Name the mobile charge carriers responsible for conduction of electric current in (i) an electrolyte (ii) an ionised gas. 2
11. Calculate the value of current flowing through the resistance of 3 ohm. 1

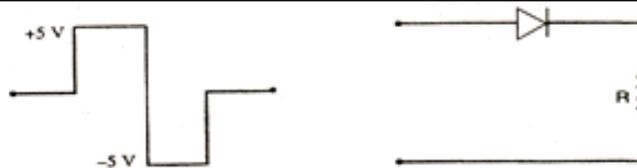


12. An electron traveling west to east enters a chamber having a uniform electrostatic field in north to south direction. Specify the direction in which a uniform magnetic field should be set up to prevent the electron from deflecting from its straight line path. 2
13. A bulb and a capacitor are connected in series to a source of alternating current. What will happen on increasing the frequency of a.c source? 2
14. A long solenoid with 15 turns per cm has a small loop of area 2.0 cm^2 placed inside normal to the axis of the solenoid. If the current carried by the solenoid changes steadily from 2A to 4A in 0.1 sec, what is the induced emf in the loop while the current is changing? 2
15. A plane electromagnetic wave travels in vacuum along Z-direction. What can you say about the directions of electric and magnetic field vectors? If the frequency of the wave is 30 MHz, what is its wavelength? 2
16. A diver under water looks obliquely at a fisherman standing on the bank of a lake. Would the fisherman look taller or shorter to the diver than what he actually is? 2
17. Explain, with the help of a circuit diagram, how the thickness of depletion layer in a p-n junction diode changes when it is forward biased. In the following circuits which one of the two diodes is forward biased and which is reverse biased? 2



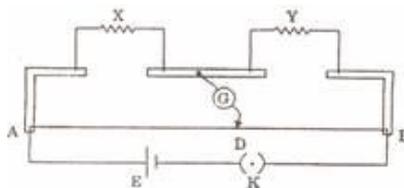
Or

Draw and explain the output waveform across the load resistor R, if the input waveform is as shown in the given figure. 2



18. Distinguish between frequency modulation and amplitude modulation. Why is an FM signal less susceptible to noise than an AM signal? 2

19. In a metre bridge, the balance point is found to be at 39.5 cm from the end A, when the resistor Y is of 12.5 ohm. Determine the resistance of X. Why are the connections between resistors in a metre bridge made of thick copper strips? What happens if the galvanometer and cell are interchanged at the balance point of the bridge? Would the galvanometer show any current? 3



20. A circuit containing an 80 mH inductor, a 60 iF capacitor and a 15 ohm resistor are connected to a 230V, 50 Hz supply. Obtain the average power transferred to each element of the circuit and total power absorbed. 3

21. A beam of light converges to a point P. A lens is placed in the path of the convergent beam 12 cm from P. At what point does the beam converge if the lens is 3

(i) a convex lens of focal length 20 cm, (ii) a concave lens of focal length 16 cm ?

Do the required calculations.

22. A ray of light when moves from denser to rarer medium undergo total internal reflection. Drive the expression for critical angle in terms of speed of light in the respective media. 3

23. Define the terms threshold frequency and stopping potential in relation to the phenomenon of photoelectric effect. How is the photoelectric current affected on increasing the (i) frequency (ii) intensity of the incident radiations and why? 3

Or

The work function of caesium metal is 2.14 eV. When light of frequency 6×10^{14} Hz is incident on the metal surface, photoemission of electrons occurs. What is the maximum kinetic energy of the emitted electrons, stopping potential and maximum speed of emitted electrons. 3

24. Draw a graph showing the variation of binding energy per nucleon with mass number for different nuclei. Explain, with the help of this graph, the release of energy by the process of nuclear fusion. 3

25. A hydrogen atom initially in the ground state absorbs a photon, which excites it to the $n=4$ level. Determine the wavelength and frequency of photon. 3

26. Explain (i) forward biasing, (ii) reverse biasing of a P-N junction diode. With the help of a circuit diagram, explain the use of this device as a half - wave rectifier. 3

27. (a) Draw the block diagram of a communication system.

(b) What is meant by 'detection' of a modulated carrier wave? Describe briefly the essential steps for detection. 3

28. (a) State and prove the Gauss's theorem in electrostatics.

(b) Using this theorem derive an expression for the electric field at a point due to an infinitely long, thin uniformly charged straight wire. 5

Or

(a) Show that the energy stored in a parallel plate capacitor is $\frac{1}{2} C V^2$. Hence derive an expression for the energy density of a capacitor.

(b) An electric dipole with a dipole moment 4×10^9 Cm is aligned at 30° with the direction of a uniform electric field of magnitude 5×10^4 N/C. Calculate the magnitude of the torque on the dipole.

29. With the help of a neat and labelled diagram, explain the underlying principle and working of a moving coil galvanometer. What is the function of (i) uniform radial magnetic field and (ii) soft iron core in such a device? 5

Or

State and prove Biot Savart Law. Use it to derive an expression for the magnetic field produced at a point near a long current carrying conductor.

30. What is diffraction of light? Draw a graph showing the variation of intensity with angle in a single slit diffraction experiment. Write one feature which distinguishes the observed pattern from the double slit interference pattern.

How would the diffraction pattern of a single slit be affected when:

(i) the width of the slit is decreased? (ii) the monochromatic source of light is replaced by a source of white light? 5

Or

(a) With the help of a labeled ray diagram show the image formation by a compound microscope. Derive an expression for its magnifying power.

(b) How does the resolving power of a compound microscope get affected on (i) decreasing the diameter of its objective and (ii) increasing the focal length of its objective? 5