CLASS XII
SAMPLE PAPER
PHYSICS

Time allowed: 3 hours   *Maximum marks: 70*

General Instructions:
(i) Question numbers 1 to 8 are very short answer type questions, carrying one mark each.
(ii) Question numbers 9 to 16 are short answer type questions, carrying two marks each.
(iii) Question numbers 17 to 25 are also short answer questions, carrying three marks each.
(iv) Question number 26 is a value based question, carrying four marks.
(v) Question numbers 27 to 29 are long answer type questions, carrying five marks each.

Q.1> A charge "q" is placed at the center of a cube. What is the net flux through one of its face?

Q.2> Give a reason why microwaves are better carriers of signal for long-range transmission than radio waves

Q.3> Give 2 factors by which voltage sensitivity of a moving coil galvanometer can be increased

Q.4> What is power dissipation in A.C. circuit where voltage is $V = 300\sin(\omega t + \pi/2)$ and current is $I = 5\sin\omega t$

Q.5> Draw the graph showing the variation of intensity of polarized light transmitted by an analyzer.

Q.6> How does the (a) Pole strength and (b) Magnetic moment of each part of a bar magnet change if it is cut into two equal pieces transverse to its length

Q.7> An electron beam projected along + X-axis, experiences a force due to a magnetic field along the +Y-axis. What is the direction of the magnetic field?

Q.8> The electric field and electric potential at any point due to a point charge kept in air is 20 NC^{-1} and 10 JC^{-1} respectively. Compute the magnitude of this charge.

Q.9> Write the mathematical relation between mobility and drift velocity of charge carriers in a conductor. Name mobile charge carriers responsible for conduction of current in (i) an electrolyte (ii) an ionized gas.

Q.10> Prove that the instantaneous rate of change of the activity of a radioactive substance is inversely proportional to the square of its half life.

Q.11> Why should the material used for making permanent magnets have high coercivity?

Q.12> Differentiate b/w AM and FM and explain why the latter is preferred.

Q.13> A convex lens of refractive index 1.5 has a focal length of 18 cm in air. Calculate the change in its focal length when it is immersed in a liquid having refractive index (a) 1.3   (b) 2

Q.14> Deduce an expression for the electric potential due to an electric dipole at any point on its axis. Mention one contrasting feature of electric potential of a dipole at a point as compared to that due to a single charge.

Q.15> What is angle of dip? What is the angle of dip at (a) Poles   (b) Equator

Q.16> Distinguish b/w diamagnetic and ferromagnetic substances in respect of their
     (a) Intensity of magnetization (b) Behavior in non uniform magnetic field (c) Susceptibility

Q.17> What is meant by sensitivity of a potentiometer? A battery E of 4V and a variable resistance R are connected in series with the potentiometer wire AB (length 1m). When a cell of 1.5V is connected b/w AC no current flows through it. Length AC is 60cm. Find the potential difference b/w A and B
(b) Would the method work if battery E1 of 4V is replaced by a cell of 1V.

Q.18> Two cells of EMF 1V, 2V and internal resistances 2 and 1 respectively are connected in
(i) Series, (ii) parallel. What should be the external resistance in the circuit so that the current through the resistance be the same in the two cases? In which case more heat is generated in the cells?

Q.19> In a plot of photoelectric current versus anode potential, Justify, how does
(i) The saturation current vary with anode potential for different frequencies but same intensity?
(ii) The stopping potential vary for incident radiations of different intensities but same frequency?
(iii) Photoelectric current vary for different intensities but same frequency of incident radiations?

Q.20> A bar magnet, held horizontally, is set into angular oscillations in Earth magnetic field. It has time periods T_1 and T_2 at two places, where the angles of dip are θ_1 and θ_2 respectively. Deduce an expression for the ratio of the resultant magnetic fields at the two places.

Q.21> State Huygen's principle and using it establish the relation between angle of incidence and the angle of refraction when light goes from a denser to rarer medium.

Q.22> Derive an expression for the width of the central maximum for diffraction of light at a single slit. How does this width change with increase in width of the slit?

Q.23> Derive a mathematical expression for the force acting on a current carrying straight conductor kept in a magnetic field. State the rule used to determine the direction of this force.

Q.24> With the help of a labeled circuit diagram, explain how will you determine the internal resistance of a primary cell using a potentiometer. State the formula used.

Q.25> Derive an expression for the frequency of the side bands produced in Amplitude modulation. Under what condition can different stations operate without interfering?

Q.26> Rahul's younger brother was amazed to see a tall antenna like structure at the top of a tall building. Rahul told him that this was a lightening conductor and explained how it helped in saving the building from the wrath of lightening. (a) What are the values displayed by Rahul? (b) Briefly explain the working of lightening conductors.

Q.27> Explain the principle construction and working of a Van de graff generator.
(b) The radius of the metallic sphere is 10m and the dielectric strength of the gas is 10^8V/m. For safety reasons, the field should never exceed 20% of this value. What is the maximum charge that can be given to the sphere?

Q.28> What is interference of light? Write two essential conditions for sustained interference pattern to be produced on the screen. Draw a graph showing the variation of intensity versus the position on the screen in Young's experiment when (a) both the slits are opened and (b) one of the slits is closed.
What is the effect on the interference pattern in Young's double slit experiment when:
    (i) Screen is moved closer to the plane of slits?
    (ii) Separation between two slits is increased. Explain your answer in each case.

Q.29> State Biot-Savart's law. Using this law, derive the expression for the magnetic field due to a current carrying circular loop of radius 'R', at a point which is at a distance 'x' from its centre along the axis of the loop. Show that this formula reduces to the formula for B at the centre of a coil in case of x = 0
(b) Two concentric coils have radius 4m and 5m. The smaller coil carries a current of 10A in the clockwise direction. What should be the magnitude and direction of current in the other so that the net magnetic induction at the common center is zero?

For Solutions, please write to
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