

The Jammu and Kashmir State Board of School Education
Academic Division, New Campus, Bemina, Srinagar

MODEL PAPER

PHYSICS 12th

Maximum Marks: 70

Time Allowed: 3 hrs

SECTION A

Long Answer Type Questions:

Q.1. State the Theorem which relates the enclosed charge inside a closed surface with surface integral of Electric field. Use this theorem to obtain the electric field due to an infinite plane sheet of charge.

OR

Show that capacity of a parallel plate capacitor depends upon the geometrical factors of capacitor. If the distance between the plates is increased how does it affect the capacitance and energy of the capacitor? **(5 Marks)**

Q.2. Two long straight parallel wires carry currents I_1 and I_2 in the same direction. Find an expression for the force per unit length between them. Depict the pattern of magnetic field lines. Use the expression to define S.I unit of current.

OR

Highly energetic positively charged particles are usually used to carry nuclear reactions. Give name, principle, construction and working of the machine used for the purpose. **(5 Marks)**

Q.3. If an a.c. of the form $I=I_0 \sin \omega t$ is fed to an LCR series circuit so that emf leads the current by ϕ . Deduce an expression for average power consumed. Hence define power factor.

OR

Name the device which converts mechanical energy into alternating electrical energy. Give its principle, construction and theory with the help of diagram. **(5 Marks)**

Q.4. Derive lens makers formula in case of double convex lens. Write down the sign conventions and assumption used.

OR

With the help of a ray diagram, illustrate the formation of the final image of an object in the compound microscope. Derive the expression for magnifying power. How it can be increased? **(5 Marks)**

SECTION B

Short Answer Type Questions:

- Q.5.** A charge having magnitude Q is divided into two parts q and $(Q-q)$. If the two parts exert a maximum force of repulsion on each other, then find the value of $\frac{Q}{q}$. **(3 Marks)**
- Q.6.** Explain principle of potentiometer. How can a potentiometer be made more sensitive **(3 Marks)**
- Q.7.** The thermal velocity of the free electron in a metallic conductor varies from 10^5 to 10^6 m/s. In spite of high velocity; free electrons fail to escape from the metallic surface. Explain why **(3 Marks)**
- Q.8.** Magnetic flux linked with a circuit is $\phi = (3t^2 + 4t + 5)$ Weber. Calculate the induced emf at $t = 3$ sec. Whether it is positive or negative. **(3 Marks)**
- Q.9** State and explain Huygens Principle? **(3 Marks)**
- Q.10.** Derive de-Broglie wave equation for matter. Also derive it for an electron of mass 'm' and accelerated by a potential 'V' **(3 Marks)**
- Q.11.** what is radioactive decay law? Derive an expression for it in a mathematical form. **(3 Marks)**
- Q.12.** With the help of a circuit diagram, explain how Zener diode can be used as a voltage regulator. **(3 Marks)**

SECTION C

Very Short Answer Type Questions:

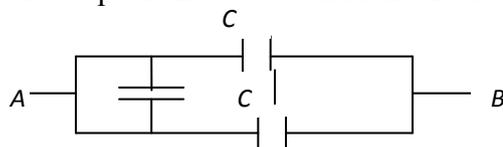
- Q.13.** What do mean by elements of earth's magnetic field. Name them. **(2 Marks)**
- Q.14.** What Physical quantity same for x-rays of wavelength 10^{-10} m, red light of wave length 7800 \AA and radio waves of wave length 500m in vacuum. **(2 Marks)**
- Q.15.** The angle of minimum deviation for a prism of $\frac{\pi}{3}$ is $\frac{\pi}{6}$. Calculate the refractive index of the material of a prism. **(2 Marks)**
- Q.16.** Calculate the angular momentum of an electron in Bohr's Hydrogen atom whose energy is -3.4eV. Find also the radius of that particular orbit? **(2 Marks)**

- Q.17.** Give the truth table and logic symbol of three –input NAND gate. **(2 Marks)**
- Q.18.** Write two factors justifying the need of modulating signal. **(2 Marks)**
- Q.19.** Sky wave propagation is not possible for waves having frequency more than 30 MHz. Give reasons in two points. **(2 Marks)**
- Q.20.** Why we are not able to see a clear and transparent glass sheet when immersed in clear water. **(2 Marks)**

SECTION D

Objective Type Questions:

- Q.21.** Find the equivalent capacitance between A and B of the following circuit. **(1 Mark)**



- Q.22.** The magnetic field at any point on the conductor carrying current is ----- . **(1 Mark)**
- Q.23.** Write down the mirror formula for plane mirror. **(1 Mark)**
- Q.24.** What is the source of displacement current? **(1 Marks)**
- Q.25.** Do all the electrons emitted in photoelectric effect have the same kinetic energy? If not, why? **(1 Marks)**
- Q.26.** The longest wave length emitted in Lyman series is obtained when electron jumps from -----orbit to -----orbit. **(1 Marks)**
- Q.27.** The current gain in common emitter transistor configuration is 15. Find the collector current if base current is $10\mu\text{A}$. **(1 Mark)**
- Q.28.** Name the three important components of basic communication system. **(1 Mark)**
- Q.29.** If Young's double slit experiment is performed in water instead of air, then the fringe width **(1 Mark)**
- Increases
 - Decreases
 - Remains same
 - Information incomplete
- Q.30.** n-type extrinsic semi-conductor is **(1 Mark)**
- Negatively charge
 - Positively charged
 - Electrically neutral
 - None of the above.