

INTERNATIONAL INDIAN SCHOOL BURAI DAH
TERM EXAMINATION 2019-20
CLASS – XII
PHYSICS (Theory)
SET-B

TIME: 3 Hours

Max.Marks:70

SECTION-A

1. Sketch the electric lines of force due to a point charge(i) $q > 0$ (ii) $q < 0$. (1)
2. Is electric field intensity a scalar or vector quantity. Give its SI unit. (1)
3. An electrostatic line of force is a continuous curve. A line of force cannot have sudden breaks. Why? (1)
4. What is electron volt? How is it related to joule? (1)
5. Define dielectric constant in terms of the capacitance of a capacitor? (1)
6. What would be the work done if a point charge $+q$ is taken from a point A to a point B on the circumference of a circle drawn with another point charge $+q$ at the centre. (1)
7. Deduce dimensional formula for potential difference. (1)
8. How does the drift velocity of an electron in a metallic conductor vary with increase in temperature? (1)
9. Explain why wires of supply line do not get much heated as the filament of the lamp? (1)
10. In what respect does a wire carrying current differ from a wire carrying no current? (1)
11. What is magnetic Lorentz force? (1)
12. How does the knowledge of the declination at a place help navigation? (1)
13. State Curie law in magnetism. (1)
14. Why do magnetic field lines prefer to pass through ferromagnetic material than through air? (1)
15. A 3.0cm wire carrying current of 10A is placed inside a solenoid perpendicular to its axis. The magnetic field inside the solenoid is 0.27T. What is the magnetic force on the wire? (1)
16. Refractive index of glass is $\frac{3}{2}$ and that of water is $\frac{4}{3}$. Find the refractive index of glass with respect to water. (1)
17. Why do diamonds shine? (1)
18. The sun is seen before it has actually risen above the horizon. Why? (1)
19. A plane electromagnetic wave of frequency 25MHz travels in free space along x-direction. At a particular point in space and time $E = 6.3 \text{ jV/m}$. what is B at this point? (1)
20. What is Meissner effect? (1)

SECTION-B

21. Deduce an expression for the electric field at a point on the axial plane of an electric dipole. (2)
22. Define the term polarization of a dielectric and write its relation with susceptibility. (2)
23. Derive an expression for drift velocity of free electrons in a conductor in terms of relaxation time. (2)
24. How is a moving coil galvanometer converted into a voltmeter? Explain with necessary circuit diagram. (2)
25. Write two properties of a material which make it suitable for making electromagnet? (2)
26. Define power of a lens. Deduce the expression for power of two thin lenses in contact. (2)
27. Give two uses each of (i) Radio waves (ii) Micro-waves). (2)

SECTION-C

28. Establish the relation between current ~~density~~ and drift velocity.

OR

- Derive an expression for magnification in a simple microscope. (3)
29. Derive an expression for the force between two long parallel current carrying conductors. (3)
30. Name the following constituent radiation of electromagnetic spectrum which
 - (a) produce intense heating effect.
 - (b) is absorbed by ozone layer in the atmosphere.
 - (c) is used for studying crystal structure. (3)
31. Using Gauss's theorem, deduce an expression for the electric field due to a uniformly charged spherical conducting shell of radius R at a point (i) outside and (ii) inside the shell. (3)
32. Deduce an expression for the frequency of revolution of charged particle in a magnetic field and show that this is independent of the velocity or energy of the particle (3)
33. Calculate the temperature at which the resistance of a conductor becomes 20% more than its resistance at 27°C. |The value of the temperature coefficient of resistance of the conductor is 2.0×10^{-4} /K. (3)
34. Draw a labelled ray diagram to show the image formation in a refracting type astronomical telescope in the normal adjustment position. Write two drawbacks of refracting type telescopes. (3)

SECTION-D

35.(i) Write any two important points of similarities and differences between Coulomb's law for the electrostatic field and Biot-Savart's law for the magnetic field.

(ii) Use Biot-Savart's law to find the expression for the magnetic field due to a circular loop of radius r carrying current I , at its centre.

OR

State Ampere's circuital law. Obtain an expression for the magnetic field due to a toroidal solenoid by using this law. (5)

36. Define electric dipole moment. Is it a scalar or a vector?

(a) Derive the expression for the electric field of a dipole at a point on the equatorial plane of the dipole.

(b) Draw the equipotential surface due to an electric dipole.

OR

State the working principle of a potentiometer. With the help of a circuit diagram, explain how a potentiometer is used to compare the emfs. (5)

37. Draw a ray diagram to show the working of a compound microscope. Deduce an expression for the total magnification when the final image is formed at the near point.

OR

(i) Explain the principle and working of a cyclotron with the help of schematic diagram.

(ii) Write the expression for cyclotron frequency and kinetic energy of the ions accelerated. (5)