

Yashwantrao Chavan College of Science Karad

B.Sc. -I

Physics Paper IV: Electricity and Magnetism-II

Question Bank - 2023-2024

Q.1 Select the most correct alternative.

- The operator j on multiplication turns the vector through ..
(a) 180° (b) 90° (c) 60° (d) 0°
- Potential difference across the capacitance is

 - $\frac{Q}{C}$
 - $\frac{C}{Q}$
 - Q.C
 - $\frac{i}{C}$

- The S.I. unit of impedance is.....
(a) ampere (b) ohm (c) volt (d) mho
- The reciprocal of impedance of an a.c. circuit is called
(a). admittance (b) reactance (c) quality factor (d) susceptance
- At resonance, impedance of the series LCR circuit is

 - zero
 - maximum
 - minimum
 - infinity

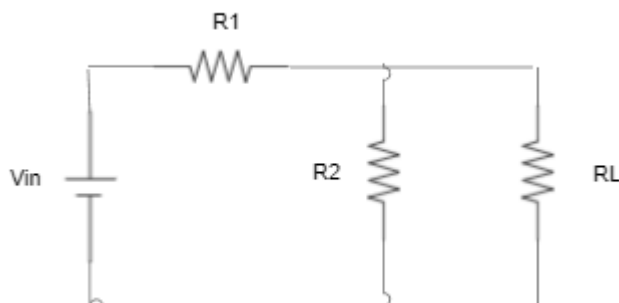
- According to Thevenin's equivalent circuit, the entire network between any two terminals can be replaced by open circuit voltage source in....
(a) series with resistance R_{th} (b) parallel with resistance R_{th}
(c) series with resistance I_N (d) parallel with voltage source V_{th}
- If Two resistances R_1 and R_2 are connected in parallel then their equivalent resistance $R_p = \dots\dots$
(a) $\frac{R_1 - R_2}{R_1 + R_2}$ (b) $\frac{R_1 R_2}{R_1 + R_2}$ (c) $\frac{R_1 + R_2}{R_1 R_2}$ (d) $\frac{R_1 + R_2}{R_1 - R_2}$
- To find V_i , in Thevenin's equivalent circuit.....
(a) remove the load resistance and measure the voltage across the terminals of load resistance
(b) measure the current flowing through the load resistance of network circuit
(c) measure the voltage across the load resistance of network circuit

- (d) reduce the voltage source
9. The time period of oscillations of B.G. is
- (a) small (b) large (c) zero (d) infinite
10. The damping in ballistic galvanometer is due to
- (a) air (b) electromagnetic (c) inductive (d) both air and electromagnetic
11. Damping due to induced current produced in the coil of B.G., when it oscillates in a magnetic field is called as
- (a) electromagnetic damping (b) air damping
- (c) magnetic damping (d) electrical damping
12. Mathematically, the magnetic intensity H is
- (a) $H = \frac{\vec{B}}{\mu_0} + \vec{M}$ (b) $H = \frac{\vec{B}}{\mu_0} - \vec{M}$
- (c) $\vec{H} = \vec{B} + \mu_0 \vec{M}$ (d) $\vec{H} = \vec{B} - \mu_0 \vec{M}$
13. The relation between the susceptibility and the relative permeability is given by
- (a) $\chi = 1 + \mu_r$ (b) $\chi = \mu_r - 1$ (c) $\chi = 1 - \mu_r$ (d) $\chi = \mu_r + 1$
14. In SI system, the susceptibility, χ has ... dimensions.
- (a) no (b) T (c) A/m (d) T/Am
15. Which of the following is diamagnetic material?
- (a) Superconductors (b) Iron (c) Nickel (d) Ferrites
16. The intensity of magnetization is the ratio of.....
- (a) net magnetic moment to the volume of the material
- (b) net magnetic moment to the length of the specimen
- (c) magnetic flux to the area of the material
- (d) magnetic field strength to the volume of the material
17. The S.I. unit of the intensity of magnetization is
- (a) A.m (b) A .m² (c) A/m (d) A/m²

18. According to Biot-Savart's law, the magnetic field at a point near current carrying conductor is
- directly proportional to the square of the distance between length segment and the point
 - inversely proportional to the magnitude of the length segment 'dl'
 - directly proportional to the magnitude of the current i
 - inversely proportional to the magnitude of the current i
19. The magnetic field due to infinite straight conductor carrying current i at a distance 'd' is B
- $\frac{\mu_0 i}{\pi d}$
 - $\frac{\mu_0 i}{\pi d^2}$
 - $\frac{\mu_0 i}{2\pi d^2}$
 - $\frac{\mu_0 i}{2\pi d}$
20. The magnetic field at a point on the centre of the current carrying coil is 0.5 T. If the current loop has 10 number of turns, then its magnetic field will be....
- 0.5 T
 - 0.05T
 - 5T
 - 10 T

Q.2 Long Answer Type Questions :

- What is ballistic galvanometer? Explain construction and working of ballistic galvanometer. Hence obtain expression for charge flowing through it.
- Find Thevenin's equivalent and Norton's equivalent circuit for the given circuit.



Where $V_{in} = 10 \text{ V}$, $R_1 = 2 \text{ K}\Omega$, $R_2 = 4 \text{ K}\Omega$, $R_L = 200 \Omega$

- Write a note on Resistance, Reactance, Impedance, Admittance and Susceptance.

4. What are the different types of magnetic materials ? Explain in brief what is diamagnetism. Also state their properties.
5. What is Biot-Savart's law ? Explain it in detail. What are the applications of Biot-Savart's law ?

Q.3 Short Answer Type Questions:

1. State any four uses of ballistic galvanometer.
2. Write a note on complex number.
3. Write a note on Owen's bridge.
4. Compare series and parallel resonant circuits.
5. Explain quality factor of series resonant circuit.
6. A coil of inductance 0.5 H and resistance 500 Ω is connected in series with capacitance of 1 pF and an alternating e.m.f. of $10 \sin 2000 \pi t$. Find the current and phase difference between e.m.f. and current.
7. Define lines of force, magnetic flux and magnetic induction.
8. Distinguish between diamagnetic and paramagnetic materials.
9. . State Ampere's circuital law and explain it in brief.
10. The magnetic moment of a bar magnet made up of steel is 2.5 Am^2 . Find the intensity of magnetization. Given: Mass of steel is $6.6 \times 10^{-3} \text{ kg}$, Density of steel is $7.9 \times 10^{-3} \text{ kg/m}$.