B.M.S COLLEGE FOR WOMEN AUTONOMOUS
BENGALURU – 560004

END SEMESTER EXAMINATION – SEPTEMBER / OCTOBER 2022

B.Sc - II Semester

Physics - Electricity & Magnetism

Course Code: PHY2DSC02 **QP Code:2013**
Duration: 2 ½ Hours **Max. Marks: 60**

Instructions: Use of non- programmable scientific calculator is allowed.

SECTION-A

Answer ALL questions. Each question carries ONE Mark. (5x1=5)

1. Which of these is gauss law
   a) $\nabla E = \rho/\varepsilon_0$ b) $\nabla \times E = \rho/\varepsilon_0$ c) $\nabla.E = \rho/\varepsilon_0$ d) $\nabla.E = \varepsilon_0/\rho$
2. If the distance between two parallel plate capacitor is d and reduced to d/2 the capacitance
   a)decreases by half b) increases by twice c) decreases by twice d) remains same
3. 10^{19} electrons flow through a wire in 1 second. The current developed is
   a)1.6×10^{-19} A b) 1.6 A c) 10^{-10} A d) 10^{10} A
4. As the frequency increases the inductive reactance also
   a)decreases b) increases c) remains same d) none of these
5. If the B applied is 5T and the area of a circular loop is $2m^2$, magnetic flux induced is
   a) 2.5 wb/m^2 b) 10 wb/m^2 c) 12.5 wb/m^2 d) 0.1 wb/m^2

SECTION-B

Answer any THREE questions. Each question carries TEN Marks. (3x10=30)

6. a) Derive an expression for electric field at a point outside uniformly charged thin spherical shell using gauss law.

b) Define potential & derive an expression for electric potential due to a point charge. (5 + 5)

7. a) Derive an expression for capacitance of a parallel plate capacitor without dielectric.

b) What is a dielectric material? Explain polar and nonpolar dielectric. (5 + 5)

8. a) State and derive Super position theorem.

b) Discuss AC applied to a pure resistor. (8 + 2)

9. Derive $\nabla \times E = -\partial B/\partial t$ & $\nabla . B = 0$ (6 + 4)

10.a) Explain dia, para and ferro magnetic materials.

b) Explain hysteresis curve. (6 + 4)

SECTION-C

Answer any THREE questions. Each question carries FIVE Marks. (3x5=15)

11. In a region the electric potential function is given by $V = 4x^2 + 3y^2 - 8z^2$. Calculate the electric field intensity at (1, 4, 8) in this region.

12. A capacitor of capacitance 1μF is discharged through a high resistance of 10MΩ. Find the time taken for half the charge on the capacitor to leak.

13. The magnetic flux linked with a coil of resistance 15Ω at any instant is given by $\phi = 15t^2 - 4t + 6$, where ϕ is in weber and t is in second. Find the magnitude of the induced emf and current at t =0.6 S

14. An ac source of 220V, 50Hz is connected to a series circuit containing a resistance 200Ω, an inductance 0.5 H and a capacitance 10μF. Calculate (a) the impedance of the circuit, (b) the phase angle.

15. A Magnetizing field of $1800 Am^{-1}$ produces a magnetic flux of 3×10^{-5} Weber in an iron bar of cross- sectional area 0.2×10^{-4} m^2. Calculate permeability. Given $\mu_0 = 4\Pi \times 10^{-7}$ H/m

SECTION-D

16. Answer any FIVE questions. Each question carries TWO Marks. (5x2=10)

(a) Ordinary rubber is an insulator. But the special rubber tyres of aircrafts are made slightly conducting. Justify

(b) Capacitor blocks DC and allows AC. Explain

(c) A Proton is moving along X axis in magnetic field acting along Y axis. What is the direction of magnetic force acting on it?

(d) Why is choke used in a fluorescent tube? Explain.

(e) Can we have magnetic monopoles? Comment.

(f) Does each atom behave like a magnet? Explain

(g) Two nearby points are at the same potential. What is the intensity of electric field in this region?

(h) When is power delivered to the load Maximum? Explain

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