

**B.Sc. Semester - 3 (CBCS) Examination**  
**Oct/Nov - 2022 (OLD COURSE)**  
**PHYSICS(CORE)**

**Time: 2:30 Hours****Marks: 70****Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate marks.

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**Q.1(a) Answer the following question (any one). (07)**

- (1) Explain scalar and vector tripple product.
- (2) Describe vectors transform.

**Q.1(b) Answer the following question (any one). (04)**

- (1) Discuss gradient.
- (2) Explain curl of a vector.

**Q.1(c) Answer the following question (any three). (03)**

- (1)  $\hat{j} \cdot \hat{j} = \dots\dots\dots$
- (2)  $\hat{j} \cdot \hat{k} = \dots\dots\dots$
- (3)  $\hat{i} \times \hat{k} = \dots\dots\dots$
- (4)  $\hat{k} \times \hat{k} = \dots\dots\dots$
- (5)  $\nabla \times (f\vec{A}) = f(\nabla \times \vec{A}) - \dots\dots\dots$

**Q.2(a) Answer the following question (any one). (07)**

- (1) Derive an equation of Gauss's law in the differential form for electric field.
- (2) Find the electric field around charged spherical shell and solid sphere.

**Q.2(b) Answer the following question (any one). (04)**

- (1) Explain electric potential.
- (2) Write a short note on energy of point charge distribution.

**Q.2(c) Answer the following question (any three). (03)**

- (1) Write an equation of Coulomb's law.
- (2) The unit of  $\epsilon_0$  in mks is  $\dots\dots\dots$
- (3) The unit of electric field in mks is  $\dots\dots\dots$
- (4) Unit of electric flux is zero if  $\theta$  is  $\dots\dots\dots$
- (5) Laplace equation is  $\nabla^2 V = \dots\dots\dots$

**Q.3(a) Answer the following question (any one). (07)**

- (1) Give the quatitative explanation of cycloid motion.
- (2) Discuss: charged flows over a line and a surface.

**Q.3(b) Answer the following question (any one). (04)**

- (1) Explain Biot-Savart law.
- (2) Explain magnetic field above staight line.

**Q.3(c) Answer the following question (any three). (03)**

- (1) The equation of Lorentz force law is  $\dots\dots\dots$
- (2) Write continuity equation.
- (3) Unit of  $\mu_0$  in mks is  $\dots\dots\dots$
- (4) Unit of magntic field B is  $\dots\dots\dots$
- (5) Curl of the magnetic field is  $\dots\dots\dots$

**Q.4(a) Answer the following question (any one).** (07)

- (1) Write a note on physical interpretation of bound charges.
- (2) Write a note on effect of a magnetic field on atomic orbits.

**Q.4(b) Answer the following question (any one).** (04)

- (1) Explain induced dipoles.
- (2) Explain: Magnetization in dia, para and ferromagnets.

**Q.4(c) Answer the following question (any three).** (03)

- (1) The net electric field inside the conductor is ..... when it is placed in an electric field.
- (2) The value of atomic polarizability is depends on .....
- (3) Unit of  $\chi_e$  is .....
- (4) The Ampere's law can also be written as  $\nabla \times \vec{H} = \dots\dots\dots$
- (5) The value of magnetic susceptibility for diamagnetic is .....

**Q.5(a) Answer the following question (any one).** (07)

- (1) Write a note on performance of transistor amplifier.
- (2) Write a note on d.c. and a.c. load lines.

**Q.5(b) Answer the following question (any one).** (04)

- (1) Explain stabilization of operating point.
- (2) Write short note on frequency response.

**Q.5(c) Answer the following question (any three).** (03)

- (1) In all transistor connections the emitter is always biased in the .....direction.
- (2) Unit of voltage gain is .....
- (3) Effect of rise of temperature of the transistor is called ..... runaway.
- (4) In phase reversal, the phase difference between input and output signal is .....
- (5) The curve between voltage gain and signal frequency of an amplifier is known as .....

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