

BSc3PhyC0301
B.Sc. Semester - 3 (CBCS) Examination
Oct/Nov - 2023 (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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- Que.1(A) Answer any one question. (07)
1. Explain scalar and vector triple product.
 2. Explain (i) fundamental theorem for gradients and (ii) fundamental theorem for divergences.
- Que.1(B) Answer any one question. (04)
1. How vectors transform?
 2. Write a note on gradient.
- Que.1(C) Answer any three questions. (03)
1. The gradient of function ϕ is a _____ quantity.
 2. The fundamental theorem for curls is also known as _____.
 3. _____ of a vector function is a vector.
 4. The divergence of a vector function $\vec{V}$ is a _____ quantity.
 5. Which fundamental theorem is known as Gauss's theorem?
- Que.2(A) Answer any one question. (07)
1. Explain electric field and continuous charge distributions of various types.
 2. Derive the Gauss's theorem in integral and differential form.
- Que.2(B) Answer any one question. (04)
1. Write a note on field lines.
 2. Write a note on electric potential.
- Que.2(C) Answer any three questions. (03)
1. Define the coulomb's law.
 2. Who gave the idea of an electric field line?
 3. Write the Poisson's equation
 4. The value of flux is positive if the lines of force are diverging. Is it true?
 5. Write the Laplace's equation.
- Que.3(A) Answer any one question. (07)
1. Explain currents when (i) charge flows over a line and (ii) charge flows over a surface.
 2. Derive an equation of magnetic field on the axis of a current carrying circular loop.
- Que.3(B) Answer any one question. (04)
1. Define magnetic field and Lorentz force relation.
 2. Derive an equation of magnetic field above a straight wire.

Que.3(C) Answer any three questions. (03)

1. Write an equation of Lorentz force.
2. For steady current, $\text{div } \vec{J} = \underline{\hspace{2cm}}$.
3. Tesla is the unit of $\underline{\hspace{2cm}}$.
4. The divergence of the magnetic field is always $\underline{\hspace{2cm}}$.
5. What is the value of magnetic field at the centre of a square loop?

Que.4(A) Answer any one question. (07)

1. Explain the bound charges in polarized object.
2. Explain the bound currents in magnetized object.

Que.4(B) Answer any one question. (04)

1. Explain the Gauss's law in the presence of dielectrics.
2. Explain effect of a magnetic field on atomic orbits.

Que.4(C) Answer any three questions. (03)

1. Magnetic susceptibility $\chi = \underline{\hspace{2cm}}$.
2. Diamagnetic substance has $\underline{\hspace{2cm}}$ magnetic susceptibility.
3. Write an equation of the volume bound charge for the polarized object.
4. Write an equation of the surface bound current for the magnetized object.
5. Relative permittivity is also known as $\underline{\hspace{2cm}}$.

Que.5(A) Answer any one question. (07)

1. Explain voltage divider method for transistor biasing.
2. What is phase reversal? Explain it in detail with graphical demonstration.

Que.5(B) Answer any one question. (04)

1. Write a note on stability factor.
2. Write a note on frequency response of a single stage R.C. coupled transistor amplifier.

Que.5(C) Answer any three questions. (03)

1. What is the range of current gain β ?
2. Write the equation of voltage gain.
3. How many ways a transistor can be connected in circuit?
4. What is the faithful amplification?
5. The bandwidth $f = \underline{\hspace{2cm}}$.
