

B.Sc. Semester - 3 (CBCS) Examination

Oct/Nov. -2018

PHYSICS(CORE)

Time: 2:30 Hours

Marks: 70

Instructions:

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

1(a) Answer the following question (any one). (7)

- (1) Explain scalar and vector tripple product.
- (2) State and prove the product rules for gradients and divergences.

1(b) Answer the following question (any one). (4)

- (1) Discuss:operator ∇ .
- (2) Describe divergence of a vector.

1(c) Answer the following question (any three). (3)

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

2(a) Answer the following question (any one). (7)

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

2(b) Answer the following question (any one). (4)

- (1) Explain continuous charge distribution of various types.
- (2) Write a short note on electric potential.

2(c) Answer the following question (any three). (3)

- (1) Write an equation for force on charges.
- (2) The value of ϵ_0 in mks is $\dots\dots\dots$
- (3) The electric field inside a spherical shell is $\dots\dots\dots$
- (4) Poisson's equation is $\nabla^2 V = \dots\dots\dots$
- (5) Laplace equation is $\nabla^2 V = \dots\dots\dots$

3(a) Answer the following question (any one). (7)

- (1) Explain currents with reference to (i) charge flows over line and (ii) charge flows over a surface.
- (2) Discuss: magnetic field of a steady current.

3(b) Answer the following question (any one). (4)

- (1) Explain Lorentz force law.
- (2) Derive an equation for steady current.

3(c) Answer the following question (any three). (3)

- (1) The equation of continuity is $\vec{\nabla} \cdot \vec{j} + \frac{\partial \rho}{\partial t} = \dots\dots\dots$
- (2) For stationary current $\vec{\nabla} \cdot \vec{j} = \dots\dots\dots$
- (3) μ_0 is called the permeability of $\dots\dots\dots$
- (4) Value of $\mu_0 = \dots\dots\dots \text{N/A}^2$.
- (5) Divergence of the magnetic field is $\dots\dots\dots$

4(a) Answer the following question (any one). (7)

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

4(b) Answer the following question (any one). (4)

- (1) Discuss: Gauss's law in the presence of dielectrics.
- (2) Explain: Magnetization in dia, para and ferromagnets.

4(c) Answer the following question (any three). (3)

- (1) The value of atomic polarizability is depend on the
- (2) Dimension of electric susceptibility is
- (3) Value of χ_e in vacuum is
- (4) The material which obeys $\vec{M} = \chi_m \vec{H}$ is calledmedia.
- (5) $\mu = \mu_0(1 + \dots\dots\dots)$.

5(a) Answer the following question (any one). (7)

- (1) Write a note on emitter bias circuit.
- (2) Write a note on d.c. and a.c. load lines.

5(b) Answer the following question (any one). (4)

- (1) Explain cut-off and saturation region of C-E transistor.
- (2) Write short note on classification amplifiers.

5(c) Answer the following question (any three). (3)

- (1) In all transistor connections the emitter is always biased in thedirection.
- (2) The zero signal values of I_C and V_{CE} are known as thepoint.
- (3) $\frac{\Delta I_C}{\Delta I_B} = \dots\dots\dots$
- (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
