

B.Sc. Semester - 3 (CBCS) Examination
Nov/Dec. -2021 (OLD COURSE)
PHYSICS(CORE)

Time: 2:30 Hours

Marks: 70

Instructions:

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

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

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

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

- (1) Discuss divergence of a vector.
- (2) Find the gradient of $f(x,y,z) = x^2 + y^3 + z^4$.

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

- (1) $\hat{i} \cdot \hat{i} = \dots\dots\dots$
- (2) $\hat{j} \cdot \hat{j} = \dots\dots\dots$
- (3) $\hat{j} \times \hat{k} = \dots\dots\dots$
- (4) $\hat{i} \times \hat{k} = \dots\dots\dots$
- (5) A vector which satisfies the condition $\vec{\nabla} \cdot \vec{V} = 0$ is called vector.

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 value of electric field around charged spherical shell and solid sphere.

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

- (1) Explain contineous charge distribution of various types.
- (2) Derive the equation of potential due to localized charge distribution .

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

- (1) Write an equation of Coulomb's law.
- (2) The value of constant ϵ_0 is C^2/Nm^2 .
- (3) The unit of electric field in mks is
- (4) Unit of electric flux is
- (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: charge flows over a line and surface.

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

- (1) Explain Biot-Savart law.
- (2) Explain curl of a magnetic field $\vec{B}$.

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

- (1) The equation of Lorentz force law is
- (2) The relation $mv=qBr$ is known as the formula.
- (3) Unit of μ_0 in mks is
- (4) Unit of magntic field B is
- (5) Divergence of the magnetic field is

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

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

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

- (1) explain susceptibility, permittivity and dielectric constant .
- (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) Value of ϵ_r in vaccum is
- (4) retain their magnetization even after the external field is removed.
- (5) The material which obeys $\vec{M} = \chi_m \vec{H}$ is called Media.

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 how transistor amplifies.

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

- (1) The zero signal values of I_C and V_{CE} are known as the point.
- (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 range of frequencies over which the gain is equal to or greater than 70.7% of the maximum gain is known as
