

23/A15

SEAT No. _____

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SARDAR PATEL UNIVERSITY

B.Sc. Semester IV (Electronics and Communication)

Subject: Electromagnetics

Subject Code: US04CELC01

Date & Day: 11th April 2019, Thursday

Time: 10:00 AM to 01:00 PM

Total Marks: 70

Note: Figures to the right indicate maximum marks.

Assume data wherever necessary.

Q-1 Multiple Choice Questions

[10]

1. Coulomb's law is defined by _____.

[a] $F = K \frac{Q_1 Q_2}{R^2}$

[b] $F = K \frac{R^2}{Q_1 Q_2}$

[c] $F = K \frac{Q_1 Q_2}{R}$

[d] $F = K \frac{R}{Q_1 Q_2}$

2. At infinity the potential is

[a] Zero

[b] Infinite

[c] Finite

[d] Not Predicted

3. The Gauss law is given by

[a] $\Psi = \oint_s \vec{D} \cdot d\vec{S}$

[b] $\Psi = \oint_s \vec{E} \cdot d\vec{S}$

[c] $\Psi = \oint_s \vec{D} \cdot d\vec{L}$

[d] $\Psi = \oint_s \vec{E} \cdot d\vec{L}$

4. Electric flux density is _____ quantity.

[a] Vector

[b] Scalar

[c] Tensor

[d] None of above

5. The total energy stored in capacitor is

[a] $W = \frac{1}{2} CV_o^2$

[b] $W = 2CV_o^2$

[c] $W = \frac{1}{4} CV_o^2$

[d] $W = 4CV_o^2$

6. The vector of operator Δ is

[a] $\frac{\partial}{\partial x} \hat{a}_x + \frac{\partial}{\partial y} \hat{a}_y + \frac{\partial}{\partial z} \hat{a}_z$

[b] $\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z}$

[c] $\frac{d}{dx} \hat{a}_x + \frac{d}{dy} \hat{a}_y + \frac{d}{dz} \hat{a}_z$

[d] $\frac{d}{dx} + \frac{d}{dy} + \frac{d}{dz}$

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7. Unit of dipole moment is _____.
- [a] C/m [b] C/m²
[c] C-m [d] C-m²
8. Maxwell's first equation is
- [a] Integral form of Coulomb's law [b] Integral form of Gauss's law
[c] Differential form of Gauss's law [d] Differential form of Coulomb's law
9. The conductor surface is _____.
- [a] Non equipotential surface [b] Superelastic surface
[c] Equipotential surface [d] Conservative surface
10. The expression for Displacement density D is
- [a] $\vec{D} = \vec{E}$ [b] $\vec{D} = \vec{E} / \epsilon_0$
[c] $\vec{D} = \epsilon_0 \vec{E}$ [d] None of above

Q-2 Answer any ten question briefly.

[10]

1. What do you mean by conservation field?
2. Define and explain in short "Field due to a continuous volume charge distribution.
3. Give an account of Maxwell's first equation in electrostatic.
4. Give the expression between potential difference between points A and B. State its unit.
5. Differentiate between coulomb's and gauss law
6. Write a note on equipotential surface.
7. Explain the term polar and non-polar molecules.
8. State the Divergence theorem and give its mathematical form.
9. Clarify through mathematical expression "no work is done in carrying the unit charge along closed path".
10. State the applications of Gauss's Law.
11. What is electric flux density?
12. If a charge $Q_1 = 3 \times 10^{-4}$ C at point M (1,2,3) and charge $Q_2 = -10^{-4}$ C at N (2,0,5) in a vacuum. Calculate the force exerted on Q_2 by Q_1 .

Q-3 (a) Derive an expression for a line charge distributed over an infinitive length of [06]
a line?

(b) Find "E" at P(1,1,1) caused by four identical neon coulomb charged located [04]
at P1(1,1,0) P2(-1,1,0) P3(-1,-1,0) P4(1,-1,0).

OR

Q-3 Derive expression for of electric field intensity due to a single point charge. [10]

Q-4 State the gauss's law and explain any two of the application of gauss's law in detail. [10]

OR

Q-4 Explain in detail the Faraday's experiment for electric flux density and also state the important conclusions from it. [10]

Q-5 (a) Write an expression for energy expended in moving a point charge in an electric field. [05]

(b) Derive the expression for energy density in electrostatic field. [05]

OR

Q-5 What is dipole? Find electric field and potential of a dipole at t distant point. [10]

Q-6 (a) Derive the continuity equation of current. [05]

(b) Discuss the boundary condition for perfect dielectric material. [05]

OR

Q-6 (a) Derive the boundary condition for the metallic conductor and state its properties. [05]

(b) What is capacitance? Derive an expression of capacitance. [05]



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