Seat NO. _____ Bill

(A-5)

No. Of Printed Pages: 2

SARDAR PATEL UNIVERSITY

S.Y.B.Sc. (Electronics & Communication) (Sem. - IV) Examination

Day & Date: Saturday, 23/04/2016

Time: 10:30 a.m. To 01:30 p.m.

Subject Code: US04CELC01

Subject: Electrodynamics

Instructions:

(a) *Figure to the right indicates full marks.*

(b) *All questions are compulsory.*

Total Marks: 70

Q-I **Multiple Choice Questions.** **[10]**

1. Electric flux density is _____ quantity.

   a) Vector b) Scalar c) Tensor d) none

2. Coulomb's law is defined by _____.

   a) $F = K\frac{Q_1Q_2}{R^2}$ b) $F = K\frac{R^2}{Q_1Q_2}$ c) $F = K\frac{Q_1Q_2}{R}$ d) $F = K\frac{R}{Q_1Q_2}$

3. The expression for Displacement density D is _____.

   a) $\vec{D} = \varepsilon_0\vec{E}$ $\vec{D} = \vec{E}/\varepsilon_0$ c) $\vec{D} = \vec{E}$ d) none

4. At infinity the potential is _____.

   a) Finite b) Zero c) Infinite d) Not Predicted

5. Current density is measured in _____.

   a) Volt / m^2 b) Ampere / m^2 c) Volt – m d) Ampere –m

6. The total energy stored in capacitor is _____.

   a) $W = \frac{1}{4}CV_a^2$ b) $W = \frac{1}{2}CV_a^2$ c) $W = 2CV_a^2$ d) $W = 4CV_a^2$

7. The vector of operator Δ is _____.

   a) $\frac{d}{dx}+\frac{d}{dy}+\frac{d}{dz}$ b) $\frac{\partial}{\partial x}+\frac{\partial}{\partial y}+\frac{\partial}{\partial z}$

   c) $\frac{\partial}{\partial x}\hat{a}x+\frac{\partial}{\partial y}\hat{a}y+\frac{\partial}{\partial z}\hat{a}z$ d) $\frac{d}{dx}\hat{a}x+\frac{d}{dy}\hat{a}y+\frac{d}{dz}\hat{a}z$

8. The electric field intensity due to infinite line charge is given by _____.

   a) $E = \frac{r\rho_L}{2\pi\varepsilon_0}\hat{a}_r$ b) $E = \frac{2\pi\rho_L}{\varepsilon_0 r}\hat{a}_r$ c) $E = \frac{\rho_L}{2\pi\varepsilon_0 r}\hat{a}_r$ d) $E = \frac{\rho_L}{4\pi\varepsilon_0}\hat{a}_r$

9. The point form of continuity equation is _____.

   a) $\vec{\nabla}\vec{J} = -\frac{\partial\rho_v}{\partial t}$ b) $\vec{\nabla}\cdot\vec{J} = \frac{\partial\rho_v}{\partial t}$ c) $\vec{\nabla}\cdot\vec{J} = -\frac{\partial\rho_v}{\partial t}$ d) $\vec{\nabla}\times\vec{J} = -\frac{\partial\rho_v}{\partial t}$

10. Maxwell's first equation is _____.

    a) Integral form of Gauss law b) Integral form of coulomb's law c) Differential form of Gauss law d) Differential form of coulomb's law

(P.T.O)

Q-II **Answer in short. (Any Ten)** [20]

1. Define and explain in short "Field due to a continuous volume charge distribution.
2. What is Electric Field Intensity? Mention its various formulas.
3. State the experimental law of coulomb and write their mathematical expression.
4. Give the relation between Electric field intensity and electric flux density.
5. Show through mathematical expression "no work is done in carrying the unit charge along closed path".
6. Define conservation field.
7. Define equipotential surface.
8. Mention Divergence theorem and give its mathematical form.
9. Explain the principle applied to conductor in electrostatic field.
10. Give the physical interpretation of point form of continuity equation.
11. State Maxwell's first equation in electrostatic.
12. Give an account of current density.

Q-III Derive an expression for a line charge distributed over an infinitive length of a line? (10)

OR

Q-III (a) Derive an expression for a sheet of charge? (05)

(b) Derive expression for of electric field intensity due to a single point charge. (05)

Q-IV State the gauss's law and explain the application of gauss's law in detail. (10)

OR

Q-IV Describe Faraday's experiment for electric flux density and state important conclusions drawn from it. (10)

Q-V Obtain an integral form of equation for moving a charge in an electric field. (10)

OR

Q-V (a) Derive the expression for energy density in electrostatic field. (05)

(b) What is dipole? Find electric field and potential of a dipole at t distant point. (05)

Q-VI Derive the boundary condition for the metallic conductor and state its properties. (10)

OR

Q-VI (a) Derive the boundary condition for perfect dielectric material. (05)

(b) Derive the continuity equation of current. (05)

****