

SARDAR PATEL UNIVERSITY

M.Sc. (Electronics and Communication) (SEM – I) Examination

Day & Date: Friday & 21/10/2016

Time: 10:00 am To 1:00 pm

Subject: Electromagnetic Theory

Subject Code: PS01CELC01

Marks: 70

Note: - Figures to the right indicate marks.

Q-1 Choose the correct answer.

[8]

1. _____ gives the relationship between a line integral around a simple closed curve C and a double integral over the plane region D bounded by C.
a) Green's theorem
b) Gauss law
c) stokes theorem
d) Divergence theorem
2. Current density measure in _____.
a) amperes per square meter
b) Tesla
c) weber
d) meter per volts
3. If ϕ is a scalar quantity then $\nabla \phi$ is a _____ quantity.
a) vector
b) scalar
c) tensor
d) imaginary
4. The SI unit of magnetic flux is the _____.
a) Weber
b) Ampere
c) Tesla
d) Amp/meter²
5. The direction of magnetic field intensity vector is _____.
a) Horizontal
b) Circumferential
c) Vertical
d) None
6. Law stating force directly proportional to charges and inversely proportional to square of radius is called _____.
a) gauss's law
b) coulombs law
c) Ohm's law
d) Newton law
7. Magnitude of dipole moment $|\vec{p}|$ is given as _____.
a) d/q
b) qd
c) q/d
d) None
8. A changing magnetic field, such as a magnet moving through a conducting coil, generates an electric field. This is known as _____.
a) Coulomb law
b) Faraday's law
c) Biot-savart's law
d) None

Q-2 Answer in short. (Any SEVEN)

1. For the given points A(3.74,105.5°,56.3°) and B(-0.845,1.464,3.63), Find the distance between A and B.
2. What is Electric field intensity?
3. Explain potential gradient.
4. State green's theorem.
5. Define Dipole and Dipole moment.
6. Write Poisson's & Laplace's equation.
7. Distinguish potential difference and potential.
8. State Faradays Law.
9. Explain Electric scalar potential.

Q-3 (a) Explain Divergence theorem. (6)

(b) Express $\vec{A} = XY\hat{i} + YZ\hat{j} + ZX\hat{k}$ in spherical co-ordinate system. (6)

OR

(b) State and explain gauss's law and its applications. (6)

Q-4 (a) Explain Boundary conditions for perfect dielectric materials. (6)

(b) Derive an expression for electric field due to sheet of line charge at some distance from the sheet. (6)

OR

(b) Derive an expression electric field density for the Co-axial cable. (6)

Q-5 (a) Derive Poisson's and Laplace equation in detail. (6)

(b) Obtain the boundary conditions for conductor. (6)

OR

(b) (B) Let $V = A \ln[B (1 - \cos\theta) / (1 + \cos\theta)]$ (6)

(a) Show that V satisfies Laplace's equation in spherical co-ordinates

(b) Select A & B so that $V = 100V$ and $|E| = 500v/m$ at $r = 5, \theta = 90^\circ, \phi = 60^\circ$

Q-6 (a) State Biot-Savart's law. Derive an expression for magnetic field intensity H using Biot-savart's law (6)

(b) Discuss Ampere's circuital law and derive the necessary expression. (6)

OR

(b) State the Maxwell's equation and derive the Maxwell's first equations in point form. (6)
