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SARDAR PATEL UNIVERSITY

(222) M.Sc. (Electronics and Communication) (Sem – I) NC Examination

Day & Date : Saturday & 18/04/2015

Time : 10:30 am To 1:30 pm

Subject : Electromagnetic Theory

Subject Code : PS01CELC01

Instructions :
(a) *Figure to the right indicates full marks.*
(b) *All questions are compulsory.*

Total Marks : 70

Q-1 Multiple Choice Question. [08]

1 When the flux $\vec{F}$ across every closed surface S in a region E vanishes, $\vec{F}$ is said to be a _____ in E.
(a) Irrotational Vector point function (b) solenoid vector point function
(c) rotational Vector point function (d) none of the above

2 Poisson's equation given as_____
a) $\nabla^2 V = -\rho V/\varepsilon_0$ b) $\nabla^2 V = \rho V/\varepsilon_0$ c) $\nabla^2 V = \rho V \varepsilon_0$ d) $\nabla^2 V = -\rho V \varepsilon_0$

3 The Value of Curl (grad F) ,where $F = 2x^2 - 3y^2 + 4z^2$ is
a) 4x -6y + 8z b) $4x\hat{i} - 6y\hat{j} + 8z\hat{k}$ c) 0 d) 3

4 The triple product of three vectors, P x (Q x R) can be expanded as _____
a) (P.Q) x R b) (P x R).Q c) Q(P.Q)-R(P.Q) d) Q(P.Q)+R(P.Q)

5 In terms of current density, Biot – Savart's Law is expressed as _____
a) $\int \frac{\vec{J}\times\vec{a_r}}{2\pi r}.dV$ b) $\int \frac{\vec{J}\times\vec{a_r}}{2\pi r^2}.dV$ c) $\int \frac{\vec{J}\times\vec{a_r}}{4\pi r}.dV$ d) $\int \frac{\vec{J}\times\vec{a_r}}{4\pi r^2}.dV$

6 Magnitude of dipole moment $|\vec{p}|$ is given as
a) qd b) q/d c) d/q d) None of these

7 _____ Gradient of magnetic scalar potential gives magnetic field intensity
a) positive b) negative c) double d) integral

8 The direction of magnetic field intensity vector is _____.
a) Vertical b) Horizontal c) Circumferential d) None of these

Q-2 Answer the following Question.(Any Seven) [14]

1 State Divergence theorem.
2 Define Scalar and vector quantities with examples.
3 What is Electric field intensity?
4 Give an account of Dipole and Dipole moment.
5 State the application of Ampere's circuital law.
6 Define magnetic flux density.
7 Explain current density.
8 Distinguish potential difference and potential.
9 State Faradays Law.

P.T.O

Q-3 **(A)** State and explain Green's theorem. [06]

(B) Express $\overrightarrow{A} = XY\hat{i} + YZ\hat{j} + ZX\hat{k}$ in spherical co-ordinate system. [06]

OR

(B) Given the two points C(-3,2,1) and D(r=5,θ=20°,ϕ=-70°) find: (a) the spherical coordinate of C. (b) the rectangular coordinates of D (c) the distance from C to D. [06]

Q-4 **(A)** Derive an expression for electric field due to sheet of line charge at some distance from the sheet. [06]

(B) Explain Boundary conditions for perfect dielectric materials. [06]

OR

(A) State and explain the experimental law of coulomb and derive its vector form. [06]

Q-5 (A) Obtain the boundary conditions for conductor. [06]

(B) If $\varepsilon = \varepsilon_0$ and $V = 8x^2yz$, find (a) V at P (2,-1, 3); (b) ρ_v at P; (c) E atP. [06]

OR

(B) Explain Poisson's and Laplace equation in detail. [06]

Q-6 **(A)** State Biot-Savart's law. Derive an expression for magnetic field intensity H using Biot-savart's law [06]

(B) Explain the concept of displacement current. [06]

OR

(B) State the Maxwell's equation and derive the Maxwell's first equations in point form. [06]

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