[61-A]

SARDAR PATEL UNIVERSITY
M.Sc. (Electronics and Communication) (Sem – I) Examination
Day & Date : Friday & 30/11/2012
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	A necessary and sufficient condition that the line integral $\int F.dR$ For every closed curve C vanishes, is a)Curl F =0　　b) div F =0　　c) Curl F ≠ 0　　d) div F≠ 0	
2	If $\vec{A} = 2x^2\hat{i} - 3yz\hat{j} + xz^2\hat{k}$ then $\nabla.A =$ _____ a)4x - 3z +2xz　　b) 4x +3z +2xz　　c) 4x +3z -2xz　　d) -4x -3z + 2xz	
3	The Value of Curl (grad F) ,where $F = 2x^2 - 3y^2 + 4z^4$ is a)4x -6y + 8z　　b)4x$\hat{i}$ - 6y$\hat{j}$ + 8z$\hat{k}$　　c) 0　　　　d) 3	
4	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) $\int \frac{\vec{j}\times\vec{a_r}}{4\pi r^2}.dV$	
5	Magnitude of dipole moment $|\vec{p}|$ is given as a)qd　　b) q/d　　c) d/q　　d) none of these	
6	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) $\nabla^2 V = -\rho V\varepsilon_0$	
7	_____ Gradient of magnetic scalar potential gives magnetic field intensity a)positive　　b) negative　　c) double　　d) integral	
8	Electric field intensity $\vec{E}$ is related to force and $\vec{F}$ force q as _____ a) $\vec{F}q$　　b) $\vec{F}/q$　　c) $\vec{F}/\sqrt{q}$　　d) $\sqrt{|F|}/q$	

Q-2	Answer the following Question.(any Seven)	[14]
1	State Green's Theorem.	
2	Given another vector B = 2a$_x$ + 2a$_y$ + 2a$_z$, find the magnitude of vector and unit vector originating from the origin.	
3	What is Electric field intensity?	
4	Distinguish potential difference and potential.	
5	Write Poisson's & Laplace's equation.	
6	Define magnetic flux density.	
7	Define current density.	
8	Explain Electric scalar potential.	

Q-3	(A) Explain Divergence theorem.	[06]
	(B)Express $\vec{A} = XY\hat{i} + YZ\hat{j} + ZX\hat{k}$ in spherical co-ordinate system.	[06]
	OR	
	(B) A 20 nc point charge is located at P (2, 4,-3) in free space. 　　(I) find E(r) (ii) E at A (-3, 2, 0).	[06]
Q-4	(A) Derive an expression electric field density for the Co-axial cable.	[06]
	(B) Explain Boundary conditions for perfect dielectric materials.	[06]
	OR	
	(B) Derive an expression for potential E due to dipoles.	[06]

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Q-5	(A) Let $V = A \ln[B (1 - \cos\theta)/ (1 + \cos\theta)]$	[06]
	(a)Show that V satisfies Laplace's equation in spherical co-ordinates	
	(b) Select A &B so that V = 100V and $|E| = 500$v/m at	
	$r = 5, \theta = 90°, \emptyset = 60°$	
	(B) Conducting plates at z =1 cm and z= 5 cm are held at potentials of -8V & 6V respectively. If the region between the plates is a homogeneous dielectric With $\varepsilon = 5\varepsilon_0$. Find	[06]
	A) the capacitance between the plates per unit area;	
	B) V(z);	
	C) D (z).	
	OR	
	(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]
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 & Explain Ampere's circuital law.	[06]

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