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SF-6491

B. E. II (Sem - IV) (EC-ECC) Examination

May/June – 2011

Electromagnetics

(Old Course)

Time : Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. 2 (Sem - 4)**

Name of the Subject :

☛ **Electromagnetics (Old)**

☛ Subject Code No. : **6 4 9 1** ☛ Section No. (1, 2,.....) : **1, 2**

Seat No. :

Student's Signature

(2) Attempt all questions.

(3) Assume suitable data wherever required.

(4) Figures to the right indicate full marks.

SECTION - I

1 (a) Answer the following questions : **10**

(1) Write the statement of coulomb's law with expression.

(2) Explain Electric field intensity.

(3) Explain Gauss's law.

(4) Define : Dielectric Constant.

(5) Explain Electric Potential.

(b) State and prove maxwell's first equation in point form. **4**

(c) Given the potential $V = (10/r^2) \sin\theta \cos\theta$, find the electric fulx density D at $(2, \pi/2, 0)$ **6**

2 (a) Derive the expression of electric field intensity at a point P in field due to infinite line charge along Z axis with uniform line charge density P_L C/m. **8**

(b) Derive the continuity equation for current. **8**

OR

2 (a) Explain poisson's and Laplace equations. **6**

(b) Convert point p (-2,6,3) from cartesian to cylindrical and sperical coordinates. **5**

(c) Given vectors $A = 3a_x+4a_y+a_z$ and $B = 2a_y-5a_z$, find the angle between A and B. **5**

3 Attempt any two : **14**

(1) What is electric dipole ? Derive the equation of E and V for Electric dipole.

(2) Derive the conductor-dielectric boundary conditions with neat diagram.

(3) Derive the expression of capacitance for parallal plate capacitor.

SECTION - II

4 (a) Answer the following : **10**

(1) State Biot-Savart's law.

(2) _____ is the source of electromagnetic field.

(a) Static Charge
(b) DC Current
(c) Electric Field
(d) AC Current

(3) _____ is used to find current distribution within a circuit.

(a) Biot-Savart's law
(b) Ampere's circuital law
(c) Divergence theorem
(d) Gauss law

(4) Define : Magnetization

(5) State uniqueness theorem.

(6) The magnetic field out of co-axial cable is _____

(a) Zero
(b) Unity
(c) Maximum
(d) Minimum

(7) What is the unit of magnetic charge ?

(a) Ampere-meter squared
(b) Ampere
(c) Coulomb
(d) Ampere-meter

(8) Define Homogeneous dielectric materials.

(9) Write Stoke's theorem.

(10) Define torque.

(b) Match the following parameters of electric circuits to that of magnetic circuits. **5**

A		B	
(1)	Current $I = \int J \cdot ds$	(1)	flux $\varphi = \int B \cdot ds$
(2)	Resistance R	(2)	Field intensity H
(3)	Field intensity E	(3)	Reluctance R
(4)	Electromotive force (emf)	(4)	Flux density $B = \frac{\psi}{S}$
(5)	Current density $J = \frac{I}{S}$	(5)	Magnetomotive force (mmf)

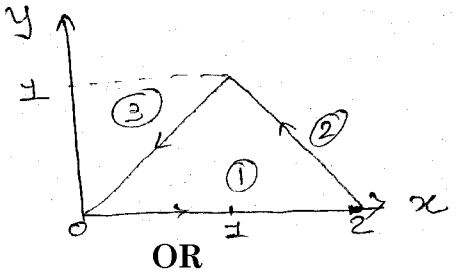
(c) Determine curl of each of following vector : **5**

(1) $\vec{A} = x^2 yz\vec{a}_x + xz\vec{a}_z$

(2) $\vec{B} = \rho \sin\phi \vec{a}_S + \rho^2 z\vec{a}_\phi + z \cos\phi \, \vec{a}_z$

5 (a) Elucidate the concept of magnetic dipole. Hence find forque experienced by a bar magnet and a small current loop. **8**

(b) The conducting triangular loop in figure given below carries a current of 10A. Find H at (0,0,5) due to side-1 of the loop. **7**



OR

5 (a) Derive the boundary conditions that H and B satisfy at the interface between two different media. **8**

(b) Determine H at (0.4, 0.3, 0) in the field of an 8A filamentary current direted inward from infinite to the origin on the positive x-axis and then outward to infinity along the y-axis. **7**

6 Answer the following : (any three) **15**

(1) Poynting theorem
(2) Continuity equation
(3) Wave motion in free space
(4) Biot-Savart's law
(5) Poison's and laplace's equations and their significance.