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Question Paper Code : 23419

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2013.

Third Semester

Electrical and Electronics Engineering

EE 1201 – ELECTROMAGNETIC THEORY

(Regulation 2004/2007)

(Common to B.E. (Part-Time) Second Semester, Regulation 2005)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is vector and vector field? Give two examples.
2. State Stoke's theorem.
3. State Coulomb's law.
4. Define Electric field intensity.
5. Define magnetic vector potential.
6. Write the Lorentz Force equation.
7. Define conduction current and displacement current.
8. Give four similarities between electric and magnetic circuits.
9. State Poynting theorem.
10. What is intrinsic impedance?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Given that field $G=(y-1)a_x+2xa_y$, find this vector field at P(2,3,1) and its projection on $B=5a_x-a_y+2a_z$. (8)

(ii) Write a brief note on sources and effects of electromagnetic fields. (8)

Or

(b) (i) Given two points P(6,4,3) and Q(2,3,4). Find A·B and angle between A and B. (8)

(ii) Explain Spherical coordinate system and differential elements in Spherical coordinate system. (8)

12. (a) (i) State and prove Gauss's law. (8)

(ii) Find Electric flux density D at (4,0,3) due to point charge –15.734mC at (4,0,0) and a line charge 9.427mC/m along the y axis. (8)

Or

(b) (i) Derive the Laplace and Possion's equation. (8)

(ii) Find the capacitance of a parallel plate capacitor

(1) When the plates are of area 1 m^2, distance between the plates 1 mm, voltage gradient is 10^5 V/m and surface charge density is $2\mu C/m^2$. (4)

(2) When the stored energy is 5mJ and the voltage across the plates is 5v. (4)

13. (a) Obtain the magnetic field intensity of an infinite long straight conductor carrying current I. (16)

Or

(b) State and prove Ampere's circuital law. (16)

14. (a) Derive an expression for force between the two parallel wires carrying currents in the same direction. (16)

Or

(b) Derive the Maxwell's equation in integral form and differential form from Gauss's law and Faraday's law. (16)

15. (a) Derive the point and integral form of Poynting vector. (16)

Or

(b) A 300 MHz uniform plane wave propagates through fresh water for which $\sigma=0$, $\mu r=1$ and $\varepsilon r=78$. Calculate : the attenuation constant, the phase constant, the wave length and intrinsic impedance. (16)