Register Number: ……………………..

B.E/B.TECH DEGREE EXAMINATIONS: NOV/DEC 2012

Third Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

EEE102: Electromagnetic Theory

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. _____ of two vectors uses the Law of Parallelogram.

   a. multiplication   b. division   c. addition   d. subtraction

2. In terms of Spherical coordinate system variables, y of Cartesian coordinate system is given

   as _____.

   a. $r \sin \theta \cos \varphi$ *b. $r \sin \theta \sin \varphi$*   *c. $r \cos \theta \sin \varphi$*   *d. $r \cos \theta \cos \varphi$*

3. ε_0 is _____ F/m.

   a. 8.854×10^{-12} b. 6.654×10^{-12} c. 8.854×10^{-10} d. 6.654×10^{-10}

4. Electric dipole is a pair of _____ and _____ point charges.

   a. Equal and same   b. Unequal and same   c. Equal and opposite   d. Unequal and opposite

5. Magnetic dipole moment is a product of _____.

   a. Current and area   b. Area and its direction

   c. Current, area and its direction   d. Current and its direction

6. Ampere's Circuital Law is analogous to _____ Law in electrostatics.

   a. Lenz's   b. Gauss's   c. Biot–Savart's   d. Faraday's

7. Maxwell's equations in _____ form give information at points of discontinuity in
   electromagnetic fields.

   a. Differential   b. Integral   c. Algebraic   d. Trignometric

8. Conduction current through a wire is _____ displacement current in capacitor.

   a. Same as   b. Different from   c. Twice of   d. None of these

9. Wave attenuation is given as _____.

   a. $e^{+\beta x}$ b. $e^{-\beta x}$ c. $e^{+\alpha x}$ d. $e^{-\alpha x}$

10. Reflection coefficient Γ is _____.

   a. ≥ 100 b. $= 10$ c. ≤ 1 d. Infinity

PART B (10 x 2 = 20 Marks)

11. What are the sources of electromagnetic fields?

12. Give the relation between Cartesian and cylindrical co-ordinate systems

13. Two point charges of 0.7 mC and 4.9 µC are situated in free space at (2, 3, 6) and (0, 0, 0). Calculate the force acting on the 0.7mC charge.

14. Write the relation between electric field intensity and electric flux density.

15. State Lorentz Law of force

16. Define magnetic moment and magnetic permeability.

17. 'Time varying field is not conservative'. Prove it

18. Write the EMF equation for moving conducting loop in a time varying field.

19. What is the velocity of electromagnetic wave in free space and in lossless dielectric?

20. Define skin depth

PART C (5 x 14 = 70 Marks)

21. a) (i) State and prove divergence theorem.   (7)

    (ii) State and prove stokes theorem.   (7)

(OR)

b) (i) Converse spherical co-ordinate system.   (7)

   (ii) Given point P (-2,6,3) and vector $A=ya_x + (x+y)a_y$, express P and A in Cylindrical and spherical co-ordinates. Evaluate A at P in the Cartesian, cylindrical and spherical system.   (7)

22. a) (i) Derive the boundary condition, between two dielectrics in electric field.

(OR)

b) (i) Derive the expression for the potential at point P, h meters above a circular disc charged to σ C/ m^2 .   (8)

   (ii) Derive the expression for energy density in electro static field   (6)

23. a) (i) Derive the expression for inductance of coaxial cable.   (7)

    (ii) Derive the expression for vector magnetic potential.   (7)

(OR)

b) (i) State Biot savart law   (2)

   (ii) Find H at the centre of a circular conductor having line charge density of +ρ_l m.   (12)

24. a) Deduce the Maxwell's equation for time varying field in point and integral form using Ampere's law, Faradays law and Gauss law.

(OR)

b) (i) Describe motional EMF and transformer EMF (10)

   (ii) Compare field theory and circuit theory. (4)

25. a) (i) Explain how an electromagnetic wave is generated. (2)

   (ii) Derive the electromagnetic wave equations in free space and mention the types of solutions. (12)

(OR)

b) How is power flow referred by using Poynting Vector? Explain Poynting's theorem. Explain its significance.

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