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VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. (ECE: CBCS) III-Semester Backlog (Old) Examinations, December-2018

Electromagnetic Theory

Time: 3 hours Max. Marks: 70

*Note: Answer **ALL** questions in **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

1. Define Scalar, Vector and Unit Vector.
2. Point charge *5 nc is* located at (2, 0, 4). Determine the force on a *1 nc* point charge located at (1, -3, 7).
3. Define Electric Potential.
4. Derive Laplace Equation.
5. Write the differences between Self and Mutual Inductance.
6. State the Stroke's theorem.
7. List out Maxwell's equations in differential form for static fields.
8. Define wave Polarization.
9. What is loss tangent?
10. Define Reflection and Transmission co-efficient for a uniform plane wave incident normally on to a place boundary between 2 material media.

Part-B (5 × 10 = 50 Marks)

11. a) State Coulomb's law. [4]
    b) Obtain the expression for the electric field due to an infinite line charge at any radial distance. [6]
12. a) Formulate the Continuity equation. [4]
    b) Derive the dielectric-dielectric boundary conditions of static electric field. [6]
13. a) State and explain Biot-Savart's law. [5]
    b) Find the magnetic field intensity at the origin due to a current element $5\pi\, a_z\, \mu A$ m at a point (2,-5,0) in free space. [5]
14. a) Derive wave equations of a uniform plane wave travelling in a free space. [5]
    b) A uniform plane wave at a frequency of 1GHz is travelling in a large block of dielectric with $\varepsilon_r = 55, \mu_r = 1\ \sigma = 0.05$. Determine $\alpha, \beta, \eta, \gamma$. [5]
15. State and prove Poynting Theorem. [10]
16. a) Obtain the co-ordinates of a Spherical Co-ordinate system in terms of Cartesian co-ordinates. [5]
    b) State and explain Gauss's law for magnetostatics. [5]
17. Answer any *two* of the following:
    a) Calculate the self-inductance of an infinitely long solenoid. [5]
    b) Derive an expression for characteristic impedance in a conducting medium. [5]
    c) Write a short note on impedance along plane conductor? [5]