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Code No. : 13305 O

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
B.E. (EEE) II Year I-Semester Backlog Examinations, December-2017

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. Determine the divergence of the vector field $M = x^2yz^2 a_x + xy^2 a_y + xyz a_z$.
2. State Coulomb's law for electrostatic fields in vector form.
3. Distinguish between conduction current density and convection current density.
4. Write the point form of Ohm's Law.
5. Calculate H at (3,-5,9) due to a current element of length 3 mm located at the origin in free space that carries a current 14 mA in $-a_y$ direction.
6. Discuss the concept of magnetic vector potential.
7. Write the primary sources of (i) electrostatic field (ii) magneto static field and (iii) electromagnetic wave.
8. Define the terms attenuation constant and phase shift constant.
9. Distinguish between EMI and EMC.
10. What is the purpose of shielding?

Part-B (5 × 10 = 50 Marks)

11. a) Let $\rho_v = (3x+4y+2z) C/m^2$ in the cubical region described by $0 \leq x, y, z \leq 3$ and the $\rho_v = 0$ outside the cube. Find the total charge in the cube. [5]
b) State and explain Gauss law of electrostatic fields. [5]
12. a) Obtain the boundary conditions of electrostatic fields for the interface between two different dielectric media. [5]
b) Find the capacitance due to two parallel conductors. Given that the radius of each conductor is 7 cm and the distance between two conductors is 1.5 m and the linear charge density on one conductor is 11 mC/m and on another conductor is -11 mC/m. [5]
13. a) State and explain Biot-Savart law. [5]
b) Determine the self inductance of a coaxial cable of inner radius a and outer radius b. [5]
14. a) In a medium characterized by $\sigma = 0, \mu = \mu_0, \epsilon_0$ and $E = 20 \sin(10^8 t - \beta z) a_y$ V/m, Calculate β and H. [6]
b) Write the significance of intrinsic impedance and propagation constant of a medium. [4]
15. a) Explain different sources and characteristics of EMI. [7]
b) What is the purpose of grounding? [3]
16. a) A circular ring of radius a carries a uniform charge ρ_l C/m and placed on the xy -plane with axis the same as z-axis. Find E at (0,0,h). [5]
b) State and explain Continuity Equation. [5]
17. Answer any two of the following:
a) Applications of Lorentz force equation. [5]
b) Derive Electromagnetic wave equation. [5]
c) Discuss Control techniques of EMI. [5]