

Hall Ticket Number:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Code No. : 13304 S

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
B.E. (EEE: CBCS) III-Semester Supplementary Examinations, May/June-2018

Electromagnetic Field Theory

Time: 3 hours

Max. Marks: 70

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

Part-A (10 × 2=20 Marks)

1. State Coulomb's Law of Electrostatics
2. Find the Unit vector along the line joining point (2, 4, 4) to point (-3, 2, 2)
3. What is dipole moment?
4. Define relaxation time.
5. Distinguish between Magnetic vector potential and Magnetic Scalar Potential.
6. Formulate the Lorentz Force equation
7. Discuss the significance of Displacement current
8. Write the Uniform plane Wave equation
9. Define the term Electro Magnetic Compatibility.
10. Differentiate the terms Bonding and Grounding

Part-B (5 × 10 = 50 Marks)

(All bits carry equal marks)

11. a) Establish relation between \mathbf{E} and \mathbf{V} and List the limitations of Gauss Law.
b) A point charge of 5nC is located at $(-3, 4, 0)$ while line $y=1; z=1$ carries uniform charge 2nC/m . If $V=0\text{V}$ at $O(0,0,0)$; find V at $A(5,0,1)$
12. a) Derive the Laplace equation and explain the general procedure for solving Laplace's equation.
b) A homogeneous dielectric ($\epsilon_r=2.5$) fills the region 1 ($x<0$) while the region 2 ($x>0$) is free space. If $\mathbf{D}_1=12\mathbf{a}_x-10\mathbf{a}_y+4\mathbf{a}_z\text{ nC/m}^2$. Determine \mathbf{D}_2 and θ_2 , where θ_2 is the angle made with the normal in region 2
13. a) Derive the Magnetic Boundary conditions with proper illustrations
b) Determine \mathbf{H} at $(-3, 4, 0)$ due to a semi-infinite current carrying conductor carrying current in $-\mathbf{a}_y$ direction.
14. a) Determine whether the following pair satisfy all Maxwell's equations in the region where $\sigma=0; \epsilon=3.5\epsilon_0; \mu=10\mu_0; \mathbf{E}=8y\mathbf{a}_y$ & $\mathbf{H}=4x\mathbf{a}_x$. Write Inferences.
b) Write the Maxwell's equations in integral form and explain their significance.
15. a) Discuss the Control techniques of EMI
b) List the natural sources of EMI and discuss the disadvantages of EMI
16. a) Determine the capacitance of a spherical capacitor with inner radius 1mm and outer radius 3mm . The capacitor is filled with a material $\epsilon_r=2.5$. Derive the equation used.
b) Given point $P(-2, 6, 3)$ and vector $\mathbf{A}=y\mathbf{a}_x+(x+z)\mathbf{a}_y$. Express P and \mathbf{A} in cylindrical coordinates. Evaluate \mathbf{A} at P in Cartesian and Cylindrical co-ordinates.
17. Answer any *two* of the following:
 - a) Derive the expression for Inductance of solenoid
 - b) Discuss the Plane wave propagation in good conductor
 - c) List the Characteristics of EMI