Hall Ticket Number:

Code No. : 13367 N/O

VASAVI COLLEGE OF ENGINEERING *(AUTONOMOUS)*, HYDERABAD

Accredited by NAAC with A++ Grade

B.E. (E.E.E.) III-Semester Main & Backlog Examinations, Jan./Feb.-2024

Electromagnetic Field Theory

Time: **3 hours** Max. Marks: **60**

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

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Check $\boldsymbol{A} = 4\,\overrightarrow{a_x} - 5\overrightarrow{a_y} - 3\overrightarrow{a_z}$ and $\boldsymbol{B} = \overrightarrow{a_x} + 6\,\overrightarrow{a_y} + 2\overrightarrow{a_z}$ are perpendicular or not.	2	2	1	1,2,3
2.	Explain Divergence theorem.	2	1	1	1,2,3
3.	Express Ohm's law in point form.	2	1	2	1,2,3
4.	Mention the properties of dielectrics.	2	1	2	1,2,3
5.	State Biot-Savart's law.	2	1	3	1,2,3
6.	Differentiate between self and mutual inductances.	2	2	3	1,2,3
7.	What is displacement current?	2	1	4	1,2,3
8.	Define Electromagnetic Compatibility (EMC.)	2	1	4	1,2,3
9.	Define attenuation constant and phase constant.	2	1	5	1,2,3
10.	What is skin depth? Explain its significance.	2	1	5	1,2,3
	Part-B (5 × 8 = 40 Marks)				
11. a)	State and explain Gauss's law. Mention its limitations.	4	1	1	1,2,3
b)	Given a field $V = r^2 \sin\theta \cos\phi$ V in free space. Calculate the electric field intensity at r = 1m, $\theta = -45^0$, $\phi = 120^0$.	4	3	1	1,2,3
12. a)	Obtain the expression for **E** due to electric dipole.	4	2	2	1,2,3
b)	A boundary exists at z = 0 between two dielectrics with relative permittivity z < 0 is 2.5 and z > 0 is 4. The field in region of permittivity 2.5 is $E = -30\overrightarrow{a_x} + 50\,\overrightarrow{a_y} + 70\overrightarrow{a_z}\,\frac{V}{m}$. Find the normal and tangential components of field intensities and flux densities.	4	4	2	1,2,3
13. a)	If magnetic vector potential is = $5r^2\,\mathbf{a}_z$ Wb/m in free space, find Magnetic field intensity.	4	3	3	1,2,3
b)	Derive the expression for **H** due to an infinite current carrying conductor.	4	2	3	1,2,3

Contd... 2

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14. a)	Express Maxwell's equations in point and integral forms.	4	2	4	1,2,3
b)	Discuss various EMI(Electromagnetic Interference) controlling techniques.	4	1	4	1,2,3
15. a)	From the fundamentals derive the plane wave equation. Express its phasor form.	4	2	5	1,2,3
b)	State and explain Poynting theorem. Express its integral form.	4	2	5	1,2,3
16. a)	Transform the vector $\boldsymbol{R} = 4\,\overrightarrow{a_x} - 2\,\overrightarrow{a_y} - 4\,\overrightarrow{a_z}$ into spherical coordinates at P(2, 3, 4)	4	3	1	1,2,3
b)	In a dielectric material, E_x=5V/m and $\mathbf{P} = \frac{1}{10\pi}(3\overrightarrow{a_x} - \overrightarrow{a_y} + 4\overrightarrow{a_z})$nC/m^2. Calculate (i) electric susceptibility and (ii) electric flux density.	4	3	2	1,2,3
17.	Answer any ***two*** of the following:				
a)	Distinguish between Scalar and vector magnetic potentials.	4	2	3	1,2,3
b)	Discuss the Effects of EMI.	4	2	4	1,2,3
c)	Explain the Wave propagation through perfect dielectric.	4	2	5	1,2,3

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	27.5%
ii)	Blooms Taxonomy Level – 2	40%
iii)	Blooms Taxonomy Level – 3 & 4	32.5%

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