Hall Ticket Number:

Code No. : 14467 N/O

VASAVI COLLEGE OF ENGINEERING *(AUTONOMOUS)*, HYDERABAD

Accredited by NAAC with A++ Grade

B.E. (E.C.E.) IV-Semester Main & Backlog Examinations, July-2023

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/PSO
1.	State the Coulomb's law of force between two point charges separated by the distance R	2	1	1	1
2.	Express curl of a vector A in Cylindrical coordinate system	2	2	1	1
3.	Draw the electric flux pattern due to (i) single point charge and (ii) dipole	2	1	2	1
4.	Define the terms linear, homogeneous and isotropic with respect to dielectric medium	2	2	2	1
5.	Find the magnetic field intensity due to infinite length current carrying conductor at a distance 0.5 m with current I = 2A along z axis.	2	1	3	2
6.	Find the magnetic field Intensity $\vec{H}$ if Plane y=0 carries sheet current with density of $\vec{K}$=2.5a_z mA/m.	2	2	3	2
7.	Calculate skin depth of a material for which σ=5 S/m and μ_r =2 at a frequency 1.25 GHz	2	1	4	2/2
8.	In free space $\vec{E}$=16$e^{-x/20}$ sin (2X10^8t-2x)a_z V/m. Find the direction of propagation, wavelength, velocity of propagation and intrinsic impedance	2	2	4	4/2
9.	Draw the equivalent circuit of transmission line with proper labeling of parameters	2	2	5	1/2
10.	A parallel polarized wave is incident from air onto distilled water with ε_r = 81. Find the Brewster's angle θ_B ?	2	2	5	2/2
	Part-B (5×8 = 40 Marks)				
11. a)	Derive the expression for $\vec{E}$ due to the infinite line of charge placed along z axis.	4	2	1	1
b)	Find the electric field intensity $\vec{E}$ due to infinite length coaxial cable at any point (i) Inside the inner cylinder (ii) Between the inner and outer cylinders (iii) Out side the outer cylinder	4	3	1	2

Contd... 2

Code No. : 14467 N/O

12. a)	A scalar potential in the certain region is given by V = 5x + 4y2 + 2z3 volts. Find Electric field intensity $\vec{E}$ at (2,3,5).	4	3	2	2
b)	Find the work done to move a point charge of 5 mC from point P(2,1,3) to point A(4,-2,5) in the electric field $\vec{E} = 4\widehat{a_x} + 3x^2\widehat{a_y} + 2yz^2\widehat{a_z}$	4	3	2	2
13. a)	Derive the magnetic field intensity due to a infinite current sheet.	4	2	3	4
b)	Evaluate the inductance of a solenoid with length "l" and number of turns "N"	4	3	3	2
14. a)	Formulate Maxwell's differential equations from the corresponding integral equations using Gauss Divergence theorem and Stokes theorem	4	2	4	4/2
b)	What is the inconsistency of Ampere's circuital law and how it is rectified and derive the modified Ampere's Circuital law	4	3	4	2/2
15. a)	State Poynting vector theorem and Prove the Poynting vector theorem for electromagnetic wave	4	2	5	4/2
b)	Formulate the expression for reflection coefficient of electric field when the wave incident with normal incidence $\theta_i=0^0$.	4	4	5	4/2
16. a)	Define Conservative property and show that electrostatic field is conservative	4	4	1	2
b)	What are the applications of boundary conditions? Derive the boundary conditions for static electric fields between dielectric and dielectric media interface	4	4	2	1,2
17.	Answer any ***two*** of the following:				
a)	What are the different ways of finding the magnetic field intensity and express magnetic field intensity $\hat{H}$.and magnetic vector potential $\hat{A}$. in terms of current elements $I\hat{dl}$,	4	1	3	2
b)	What are the advantages of wave equations? Derive wave equation for electric filed starting from Faraday's law of electromagnetic induction in differential form	4	1	4	2/2
c)	When the input impedance of a transmission line is given by $Z_{in}(l) = Z_0\left[\frac{Z_L + jZ_0\tan\beta l}{Z_0 + jZ_L\tan\beta l}\right]$ Calculate input impedance of with (i) short load , (ii) Matched load, (iii) open load	4	3	5	4/2

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

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	35%
iii)	Blooms Taxonomy Level – 3 & 4	45%

*****