RollNo. | | | | | | | | | | |

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. /B.Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, NOV / DEC 2024

ELECTRICAL AND ELECTRONICS ENGINEERING

3rd Semester

EE5302-ELECTROMAGNETIC THEORY

(Regulation2019)

Time:3hrs Max.Marks: 100

CO1	Ability to identify appropriate coordinate systems and visualize and understand the practical significance of vector calculus
CO2	Understanding of the basic laws of electromagnetism
CO3	Ability to compute, visualize electrostatic and magneto static fields along with practical applications
CO4	Understanding of Maxwell's equations in different forms and media
CO5	Able to understand the concept of generation and propagation of electromagnetic waves through single and multiple media.

BL – Bloom's Taxonomy Levels

(L1-Remembering, L2-Understanding, L3-Applying, L4-Analysing, L5-Evaluating, L6-Creating)

PART- A(10x2=20Marks)

(Answer all Questions)

Q.No.	Questions	Marks	CO	BL
1	Find the gradient of the scalar field Q= ρ 2 cos2φ	2	1	5
2	Given vectors A=3ax+4ay+az and B = 2ay-5az,Find the angle between A and B.	2	1	5
3	Write the properties of equipotential plots.	2	2	2
4	Write the relation between D and E? Find the electric field intensity in free space if D = 60 a x C/m 3 .	2	2	4
5	Classify magnetic materials with an example.	2	3	1
6	Differentiate magnetic Scalar and vector potential	2	3	1
7	Write the Transformer and motional EMF equation in electrodynamic fields.	2	4	1
8	Enlist the applications of electrodynamic fields.	2	4	2
9	Evaluate the skin depth of a conductor, having a conductivity of 200 units. The wave frequency is 10 GHz in air.	2	5	5
10	Define Standing Wave ratio.	2	5	1

PART- B(5x 13=65Marks)

(Restrict to a maximum of 2 subdivisions)

Q.No.	Questions	Marks	CO	BL
11 (a)	(i) Briefly discuss Sources and effects of electromagnetic fields	5	1	2
	(ii) Derive an expression for electric field intensity due to a infinite line charge	8	1	3
	OR			
11 (b)	(i) Discuss the analytical method of estimating Field due to discrete charges.	5	1	2
	(ii) Derive an expression for electric field intensity due to a surface charge	8	1	3
12 (a)	(i) What is dielectric polarization and dielectric strength?	3	2	3
	(ii) Derive the boundary conditions for magnetic field in multiple media	10	2	4

	OR			
12 (b)	(i) How to calculate Energy density of parallel plate capacitor in electromagnetic fields?	**3**	2	3
	(ii) Sketch the coaxial cable and a spherical capacitor and Derive the expression for capacitance of coaxial cable and a spherical capacitor in the static electric field.	**10**	2	4
13 (a)	(i) State and explain Biot – Savart's Law .	**8**	3	1
	(ii) With neat sketch, Determine H on an infinite current sheet	5	3	4
	OR			
13 (b)	(i) State and explain Ampere's Circuit Law	**8**	3	1
	(ii) Derive the boundary conditions for magnetic field in multiple media	5	3	4
14 (a)	Obtain the expression for transformer and motional EMF equation in electrodynamic fields.	**13**	4	3
	OR			
14 (b)	Obtain the expression for Maxwell's equations in differential and integral form.	**13**	4	3
15 (a)	Derive an expression of wave propagation in the following media (i) free space (ii) Lossless dielectrics (iii) Lossy dielectric (iv) Good conductors.	**13**	5	4
	OR			
15 (b)	Determine the reflection and the transmission coeffiecnt of transverse wave in E and H fields.	**13**	5	4

PART- C(1x 15=15Marks)

(Q.No.16 is compulsory)

Q.No.	Questions	Marks	CO	BL
16.	(i) Using Maxwell's equations, determine pointing vector and power balance for EM fiels.	**10**	5	4
	(ii) Tabulate the Relation between field theory and circuit theory	**5**	4	2

ADDITIONAL CONTROLLER OF EXAMINATIONS AU CHENNAI 600 025