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

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

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

(Common to all branches)
VI Semester
ECM503 &FUNDAMENTALS OF ELECTROMAGNETICS
(Regulation 2019)

Time:3hrs Max.Marks: 100

CO1	Understand static EM field concepts
CO2	Understand time varying EM fields and solve engineering problems using Maxwell's law
CO3	Understand and analyze plane wave propagation
CO4	Understand the basics of transmission lines.
CO5	Understand the basics of antenna theory.

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	Define Electric flux density	2	1	1
2	State Coulombs Law	2	1	1
3	Write Maxwells Equation in differential form	2	2	4
4	State Faradays Law	2	2	1
5	What is Skin Effect	2	3	2
6	Define Poynting Vector and State its significance	2	3	2
7	Define Characteristic impedance of a transmission line	2	4	1
8	What is meant by standing wave ratio	2	4	2
9	What is the radiation pattern of an antenna	2	5	2
10	Mention two applications of reflector antennas	2	5	3

PART- B(5x 13=65Marks)
(Restrict to a maximum of 2 subdivisions)

Q.No.	Questions	Marks	CO	BL
11 (a)	Write Maxwell's equations in both integral and differential forms. Explain the mathematical structure and physical interpretation of each term in the equations.	13	1	4
	OR			
11 (b) (i)	With a neat diagram explain the effect of Electric field in a conductor	8	1	4
11 (b) (ii)	Derive the expression for the magnetic field due to a long straight current-carrying conductor using Ampere's Circuital Law	5	1	4
12 (a)	Explain the concepts of transformer EMF and motional EMF. Derive the expressions for both and discuss the physical significance and applications of each.	13	2	4
	OR			

12 (b)(i)	Using Lorentz force Equation, explain how force is exerted on a Unit Charged particle and on a Current element	8	2	4
12 (b)(ii)	Derive Biot Savart law with necessary diagram	5	2	4
13 (a)	Discuss the reflection and transmission of a uniform plane wave at the boundary between two dielectric media for normal incidence	13	3	2
	OR			
13 (b)	Describe the concept of polarization of electromagnetic waves. Explain different types of polarization with diagram	13	3	2
14 (a)(i)	Explain the working of a slotted line for impedance measurement at microwave frequencies	7	4	3
14 (a)(ii)	Explain how transmission lines can be used as reactive circuit elements at high frequencies	6	4	3
	OR			
14 (b)	With a neat diagram, describe the structure and working of microstrip transmission lines. Also derive the expression for its characteristic impedance	13	4	3
15 (a)(i)	Describe the structure, working principle, and advantages of a Yagi-Uda array. Explain how it achieves directivity	6	5	1
15 (a)(ii)	Describe the construction, operation, radiation characteristics and parameters of a quarter-wave monopole antenna	7	5	1
	OR			
15 (b)	Explain the design and working of a microstrip patch antenna. List its advantages, limitations, and applications	13	5	1

PART- C(1x 15=15Marks)
(Q.No.16 is compulsory)

Q.No.	Questions	Marks	CO	BL
16.	Explain the boundary conditions for electric field and electric flux density at the interface between any two media. Derive the expressions and illustrate with a diagram	15	1	5