R17 Regulation *Subject code: 1P5DA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech III Year I Semester Supplementary Examinations, July 2024

ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

(ECE)

Maximum Marks: 70 Date:19.07.2024 Duration: 3 hours

Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X2M=20 Marks)		CO	Bloom Tx
1	State coulomb's law.	1	L1
2	Write the Maxwell's two equations for electrostatic fields?	1	L1
3	Write the Maxwell's two equations for Magneto static fields?	2	L1
4	List the boundary conditions for dielectric conductor interfaces.	2	L1
5	Give an expression for intrinsic impedance in phasor form.	3	L1
6	Explain in brief significance of loss tangent.	3	L1
7	State Maxwell's four laws in derivative form.	4	L1
8	Find skin depth at 1GHz for copper having conductivity 5.7×10^7 mho/m	4	L1
9	Define reflection coefficient.	5	L1
10	What is a stub? Give the advantages.	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)			
11	a) State and explain the coulomb law. Point charges 1 mC and - 2 mC are located at (3, 2, -1) and (1, 1, 4), respectively. Calculate the electric force on a 10nC charge located at (0, 3, and 1) and the electric field intensity at that point. [5] b) What are the different types of current densities and define them? [5]	1	L2
	OR		
12	a) Define Electric potential and derive the relationship between Electric field and Electric potential? [5] b) Derive the "Poisson's and Laplace's" equation and mention their applications? [5]	1	L2
13	a) Explain the Ampere's Circuit law and derive any two applications of Ampere's Circuit law? [5] b) A surface current density K=20 A/m flows in Y=1 plane. Find the Magnetic field intensity at (-1, 3, 2). [5]	2	L2
	OR		

14	a) Explain the transformer and motional EMFs. [5] b) Explain the magnetic boundary conditions in detailed. [5]	2	L2
15	a) Derive the relation between E and H in a Uniform plane wave. [5] b) What are the wave equations for a lossless medium and a conducting medium for sinusoidal variations? [5]	3	L2
	OR		
16	a) Write short notes on normal incidence of a plane wave on a perfect dielectric. [5] b) A plane wave travelling in air is normally incident on a material with $\epsilon_r = 4$ and $\mu_r = 1$.Find the reflection and transmission coefficients. [5]	3	L2
17	a) Explain loading with types. [5] b) A lossless transmission line of length 0.434λ and characteristic impedance 100 Ω is terminated in an impedance 260 + j 180 Ω. Find. [5] (i) Voltage reflection co-efficient. (ii) Standing wave ratio. (iii) Input Impedance.	4	L2
	OR		
18	a) Derive secondary constants of Transmission line? [5] b) An open wire transmission line terminated in its characteristic impedance has the following primary constants at 1KHz,R=6 ohms per km,L=2mH per km,G=0.5 mhoper km and C=0.05μF per km.calculate α, β and phase velocity? [5]	4	L2
19	a) Determine the input impedance for λ/2, λ/4 and λ/8 lines impedance transformations. [5] b) Write short note on standing wave ratio. [5]	5	L2
	OR		
20	a) What are the applications of SmithChart? [5] b) One end of a lossless transmission line having the characteristic impedance of 75 Ω and length of 1 cm is short circuited. At 3 GHz, What is the input impedance at the other end of the transmission line? [5]	5	L2