R22 Regulation *Subject code: 4E4DE*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Regular Examinations, July 2024

ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

(ELECTRONICS & COMMUNICATION ENGINEERING)

Maximum Marks: 60 Date:27.07.2024 Duration: 3 hours

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

	Part-A	CO	Bloom Tx
All the following questions carry equal marks (10x1M=10 Marks)			
1.a)	Mention the properties of electric flux lines.	CO1	BL2
b)	Define the term – Relaxation Time.	CO1	BL2
c)	Compare magnetic scalar potential and magnetic vector potential.	CO2	BL2
d)	Give the equation of transformer emf.	CO2	BL1
e)	Mention the properties of uniform plane wave.	CO3	BL1
f)	Define Brewster angle.	CO3	BL1
g)	Define Transmission line.	CO4	BL1
h)	What is the need for loading of transmission lines?	CO4	BL2
i)	Define UHF lines.	CO5	BL1
j)	What are the advantages of short circuited stub?	CO5	BL2
	Part-B		
Answer All the following questions. (5X10M=50Marks)			
2	A. State Coulomb's law and write the equation of F that exists between two unlike Charges. B. Three Point Charges $Q_1 = 1\ mc$, $Q_2 = 2\ mc$ and $Q_3 = -3\ mc$ are respectively located at (0,0,4), (-2,6,1) and (3,-4,-8). Calculate the force on Q_1. (5+5)	CO1	BL3
	OR		
3	Define and derive Convection and Conduction Current. (10)	CO1	BL4
4	A. State and explain Biot-Savart's law. B. Derive an expression for the force between two current carrying conductors. (5+5)	CO2	BL4
	OR		
5	A. Derive the expression for Displacement current. B. A parallel-plate capacitor with plate area of 5 cm^2 and plate separation of 3 mm has a voltage $50 \sin 10^3 t\ V$ applied to its plates. Calculate the displacement current assuming $\varepsilon = 2\varepsilon_0$. (5+5)	CO2	BL4

6	A. Derive the wave equations for perfect dielectric medium. B. Discuss group velocity, phase velocity and propagation constant of electromagnetic waves. (5+5)	CO3	BL3
	OR		
7	Ensure the Transmission for perfect conductor with normal incidence. (10)	CO3	BL3
8	Derive the secondary constants using R, L, G, C and find the velocity of propagation. (10)	CO4	BL4
	OR		
9	A. Explain the conditions which are used for minimum attenuation in transmission line. B. Define lossless and distortion less transmission lines and write the conditions for both. (5+5)	CO4	BL3
10	A. Derive the relation between reflection coefficient and characteristic impedance. B. A lossless transmission line length 'l' with $Z_0 = 50$ is terminated by a load of $Z_L = 50 + j50$. Determine the reflection coefficient "R_τ" and the standing wave ratio (VSWR). (5+5)	CO5	BL4
	OR		
11	Describe the construction of smith chart and give its applications. (10)	CO5	BL3