R18 Regulation *Subject code:2P5DA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Supplementary Examinations, December 2024

ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

(ECE)

Maximum Marks: 70 Date:23.12.2024 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	State Bio-savart's law.	2	L1
4	List the boundary conditions for dielectric conductor interfaces.	2	L1
5	Define the term "Uniform plane waves."	3	L1
6	Define reflection coefficient and transmission coefficient.	3	L1
7	List the types of transmission lines.	4	L1
8	How does group velocity vary when compared to phase velocity?	4	L1
9	What are the two families of circles that constitute the Smith Chart?	5	L1
10	What are the advantages and disadvantages of a Single Stub?	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		CO	Bloom Tx
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 10-nC charge located at (0, 3, and 1) and the electric field intensity at that point. [5M] B) What are the different types of current densities and define them?[5M]	1	L2
	OR		
12	A)Define Electric potential and Derive the relationship between Electric field and Electric potential? [5M] B) Derive the "Poisson's and Laplace's" equation and mention their applications? [5M]	1	L2
13	A)Explain the Ampere's Circuit law and derive any two applications of Ampere's Circuit law? [5M] B)A surface current density K=20 A/m flows in Y=1 plane. Find the Magnetic field intensity at (-1, 3, 2). [5M]	2	L2
	OR		
14	A)Explain the transformer and motional EMFs? [5M]	2	L2

	B)Explain the magnetic boundary conditions in detailed? [5M]		
15	A)Derive the relation between E and H in a Uniform plane wave. [5M] B)What are the wave equations for a lossless medium and a conducting medium for sinusoidal variations? [5M]	3	L2
	OR		
16	A)Write short notes on normal incidence of a plane wave on a perfect dielectric. [5M] B)A plane wave travelling in air is normally incident on a material with ϵ_r =4 and μ_r =1.Find the reflection and transmission coefficients. [5M]	3	L2
17	A)Discuss in brief about inductance loading of telephone cables. [5M] B)A lossless transmission line of length 0.434λ and characteristic impedance 100 Ω is terminated in an impedance 260 + j 180 Ω. Find (i) Voltage reflection co-efficient. [5M] (ii) Standing wave ratio. (iii) Input Impedance	4	L2
	OR		
18	A)The attenuation constant on a 50 Ωdistortionless transmission line is 0.01dB/m. The line has a capacitance of 0.1nF/m. Find the resistance, inductance and conductance per meter of the line. [5M] B) A loss less of 100 ohms is terminated by a load which produces SWR = 3. The first maximum is found to be occurring at 320 cm. If f = 300 MHz determine the load matching. [5M]	4	L2
19	A) What are the applications of transmission lines? [5M] B) How can ultra-high frequency transmission lines be used as circuit Elements? [5M]	5	L2
	OR		
20	A) What are the applications of Smith Chart? [5M] 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? [5M]	5	L2