R18 Regulation *Subject code:2P5DA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Supplementary Examinations, May 2025

ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

(ECE)

Maximum Marks: 70 Date: 17.06.2025 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.
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)		Marks	CO	BTL
1	State coulomb's law	2M	1	L1
2	Write the Maxwell's two equations for electrostatic fields?	2M	1	L1
3	State Bio-savant's law.	2M	2	L1
4	List the boundary conditions for dielectric conductor interfaces.	2M	2	L1
5	Define the term "Uniform plane waves."	2M	3	L1
6	Define reflection coefficient and transmission coefficient.	2M	3	L1
7	List any four types of transmission lines.	2M	4	L1
8	How does group velocity vary when compared to phase velocity?	2M	4	L1
9	State Maxwell's four laws in derivative form	2M	5	L1
10	Find skin depth at 1GHz for copper having conductivity 5.7×107 mho/m	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	a) Derive Poisson's and Laplace's equations from fundamentals. List few of its applications concerned to electrostatic fields. b) An infinitely long uniform line charge is located at y=3, z = 5. If ρ_L=30nC/m, find field E intensity at (i) origin (ii) P (5, 6, 1).	5M 5M	1	L2
	OR			
12	Develop an expression for potential due to dipoles.	10M	1	L2
13	a) Distinguish between conduction and convection currents. b) Derive and explain the Biot-savarts Law.	5M 5M	2	L2
	OR			
14	a) What are boundary conditions? State the boundary conditions at the interface of dielectric and perfect conductor. b) A certain material has σ =0 and 1, ∈r = 1 if $H = 4\sin(10^6 t - 0.01z)a_y$ A/m. Use Maxwell's equations to find μ.	5M 5M	2	L2
15	a) Derive the wave equations for conducting medium, perfect dielectric medium and free space. b) Determine the general solution for uniform plane wave equation.	5M 5M	3	L2

	OR			
16	a) Derive the relationship between E and H in a uniform plane wave. b) Define critical angle. Derive the expression for critical angle.	5M 5M	3	L2
17	a) Briefly discuss the different types of transmission lines. b) Explain about various types of losses in transmission lines	5M 5M	4	L2
	OR			
18	a) Write about group velocity and phase velocity. b) Name the types of distortions on the transmission lines and explain.	5M 5M	4	L2
19	a) Write short notes on UHF lines as circuit elements? b) If a transmission line of characteristic impedance is 50 ohms is terminated in complex impedance 25+j100 Ω.Find the reflection coefficient and VSWR of the line?	5M 5M	5	L2
	OR			
20	a) Explain reflection coefficient and VSWR of a transmission line. b) Write short notes on i). λ/8 transformation. ii). Significance of Z_{max} and Z_{min}.	5M 5M	5	L2