R18 Regulation *Subject code: 2P5DA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Supplementary Examinations, November 2025

ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

(ECE)

Maximum Marks: 70 Date: 18.11.2025 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 Ampere'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	Define transmission lines.	2M	4	L1
8	How does group velocity vary when compared to phase velocity?	2M	4	L1
9	What is stub matching? Draw typical stub matching transmission line.	2M	5	L1
10	Define smith chart.	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
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. b) What are the different types of current densities and define them?	5M 5M	1	L2
12	a) Define Electric potential and Derive the relationship between Electric field and Electric potential? b) Derive the "Poisson's and Laplace's" equation and mention their applications?	5M 5M	1	L2
13	a) Explain Biot-Savart's law and magnetic field intensity in different current distributions? b) Explain the magnetic force on a charged particle and Lorentz force equation?	5M 5M	2	L2
14	a) Explain the transformer and motional EMFs? b) Explain the magnetic boundary conditions in detailed?	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
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
18	a) What is distortion? State the conditions that characterize a distortion less line. b) The propagation constant of a lossy transmission line is $(1+j2)m^{-1}$ and its characteristic impedance is 20 Ω at w = 1M rad/s. Find L,C, R and G for the line.	5M 5M	4	L2
19	a) What are the applications of transmission lines? b) How can ultra-high frequency transmission lines be used as circuit Elements?	5M 5M	5	L2
20	a) What are the applications of SmithChart? 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 5M	5	L2