



Regulation R18

Subject code: 2P5DA

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Supplementary Examinations, February 2024

**ELECTROMAGNETIC THEORY AND TRANSMISSION LINES
(ECE)**

Maximum Marks: 70

Date: 15.02.2024 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.
 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)

Q.NO	QUESTIONS	Marks	CO	Blooms Tx
1	State coulomb's law	2	CO1	L2
2	Write the Maxwell's two equations for electrostatic fields?	2	CO1	L1
3	State Biot-savart's law.	2	CO2	L2
4	State Maxwell' equations for loss less or non-conducting medium.	2	CO2	L2
5	Differentiate good conductors and good dielectrics?	2	CO3	L3
6	Define electromagnetic waves (or)EM waves?	2	CO3	L1
7	List the different types of transmission lines.	2	CO4	L1
8	How does group velocity vary when compared to phase velocity?	2	CO4	L2
9	Define reflection coefficient.	2	CO5	L1
10	What is single stub and double stub matching?	2	CO5	L1

Part-B

Answer All the following questions.

(10M X 5=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. Evaluate the electric force on a 10-nC charge located at (0, 3, and 1) and the electric field intensity at that point.	5	CO1	L5
11b).	Distinguish different types of current densities and define them?	5	CO1	L4

	OR			
12. a).	Define Electric potential and Derive the relationship between Electric field and Electric potential?	5	CO1	L4
12 b).	Derive the "Poisson's and Laplace's" equation and mention their applications?	5	CO1	L4
13 a).	Explain Biot-Savart's law and magnetic field intensity in different current distributions?	5	CO2	L5
13 b).	Explain the magnetic force on a charged particle and Lorentz force equation?	5	CO2	L5
	OR			
14. a).	Explain about inconsistency of Ampere's law?	5	CO2	L5
14 b).	Build the word statement for all Maxwell's equations?	5	CO2	L3
15 a).	State and Prove the Poynting theorem?	7	CO3	L5
15 b).	A Uniform plane wave at frequency of 9GHz travelling in a large block of dielectric ($\epsilon_r=55$, $\mu_r=1$ and $\sigma=0.5$). Determine propagation constant, characteristic impedance and wave length?	3	CO3	L5
	OR			
16. a).	Obtain the wave reflection by perfect conductor with normal incidence. What is Brewster angle?	3	CO3	L3
16 b).	What is polarization? Explain different types of polarization?	7	CO3	L5
17 a).	Derive and explain the condition for minimum attenuation?	5	CO4	L4
17 b).	A transmission line operating at 500MHz has $Z_0=80\Omega$, $\alpha=0.04\text{Np/m}$ and $\beta=1.5\text{ rad/m}$. Determine the line parameters R,L,G and C.	5	CO4	L5
	OR			
18 a).	Derive secondary constants of Transmission line?	6	CO4	L4
18 b).	An open wire transmission line terminated in its characteristic impedance has the following primary constants at 1KHz, $R=6\Omega/\text{km}$, $L=2\text{mH}/\text{km}$, $G=0.5\text{ mho}/\text{km}$ and $C=0.05\mu\text{F}/\text{km}$. Determine α , β and phase velocity?	4	CO4	L4
19a).	Inspect UHF lines as circuit elements?	5	CO5	L4
19 b).	If a transmission line of characteristic impedance is 50 ohms is terminated in complex impedance $25+j100\Omega$. Determine the reflection coefficient and VSWR of the line?	5	CO5	L5
	OR			
20 a).	Explain reflection coefficient and VSWR of a transmission line?	5	CO5	L5
20 b).	Explain about i). $\lambda/8$ transformation. ii). Significance of Z_{\max} and Z_{\min} .	5	CO5	L5