



R18 Regulation
TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous, Accredited by NAAC with 'A' Grade)

Subject code: 2P5DA

B.Tech V Semester Supplementary Examinations, June 2022

Electromagnetic Theory and Transmission Lines (Electronics and Communication Engineering)

Maximum Marks: 70

Date: 02.07.2022 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)

- 1 Write the Poisson's and Laplace equations.
- 2 Mention the applications of Gauss Law
- 3 List out the boundary conditions between dielectric to dielectric and dielectric to conductor
- 4 State Biot-Savart's Law.
- 5 Write the wave equations for conducting media
- 6 Define uniform plane wave.
- 7 Define loss less line and write the primary and secondary constants at this Condition?
- 8 What is the expression for propagation constant in terms of Z_{oc} and Z_{sc}
- 9 Write the applications of Smith chart
- 10 Define the terms phase velocity, group velocity

Part-B

Answer All the following questions.

(10M X 5=50Marks)

- 11 Using Gauss's law, derive the expressions for electric field intensity and electric flux density due to an infinite line of charge density ρ C/m. [10]
OR
- 12 a) A line charge $\rho_L = 400\text{pC/m}$ lies along the z-axis. The surface of zero potential passes through the point P(0,5,12)m. Find the potential at point (2,3,-4)m. [4]
b) Discuss the Maxwell's equations for electrostatic fields. [6]
- 13 Derive the electric field boundary conditions between dielectric and conductor? [10]
OR
- 14 Define Ampere Circuital law? Explain its Applications [10]
- 15 Derive the wave equations in a lossless dielectric? [10]
OR
- 16 State and prove Poynting theorem. [10]
- 17 Draw an equivalent circuit of a two wire transmission line and derive voltage and current equations of transmission line. [10]
OR

- 18 a) Derive the secondary constants for a low loss transmission line. [5]
b) The constants per km of a certain cable are:
 $R = 6.75 \text{ ohms}$; $L = 5.5 \text{ mH}$; $C = 0.00872 \text{ } \mu\text{fd}$ and $G = 0.4 \text{ } \mu \text{ mhos}$. Calculate the Characteristic impedance, attenuation constant and phase velocity when $\omega = 5000$ radians per second [5]
- 19 a) A 75Ω transmission line is terminated by a load impedance Z_L . If the line $5\lambda/8$ long. Calculate Z_{in} When $Z_L = 25 - j65 \Omega$. [5]
b) Derive the Z_{in} of a short circuit Line? [5]
OR
- 20 Explain the significance and utility of $\lambda/8$, $\lambda/4$ and $\lambda/2$ lines. [10]