



R20 Regulation

Subject code: 3P4DE

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Supplementary Examinations, December 2025

ELECTROMAGNETIC THEORY AND TRANSMISSION LINES (ECE)

Maximum Marks: 70

Date: 29.12.2025

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 Gauss's law.	2M	1	L1
2	For a medium if $\sigma = 5.8 \times 10^7$, $\epsilon_r = 2$ then what is the relaxation time.	2M	1	L1
3	Define displacement current density.	2M	2	L1
4	State the Ampere's Force Law.	2M	2	L1
5	Define critical angle.	2M	3	L1
6	Define parallel polarization.	2M	3	L1
7	List the different types of transmission lines	2M	4	L1
8	How does group velocity vary when compared to phase velocity?	2M	4	L1
9	What is the significance of Z_{max} and Z_{min} on transmission line?	2M	5	L1
10	If $Z_{sc}=50 \Omega$ and $Z_{oc}=75 \Omega$ then what is the characteristic impedance of the transmission line.	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	Derive the expression of Electric Field Intensity due to infinite line charge of line charge density ρ_l , when the charge is distributed along z axis.	10M	1	L2
OR				
12	a) Derive the continuity equation. b) The point charges -1 nC, 4 nC and 3 nC are located at (0, 0, 0), (0, 0, 1) and (1, 0, 0) respectively. Find the energy in the system.	5M 5M	1	L2
13	Derive Maxwell's two equations for static magnetic fields.	10M	2	L2
OR				
14	Write Maxwell's equations for time varying fields in word statements and point form.	10M	2	L2
15	State and prove Poynting theorem.	10M	3	L2
OR				
16	Derive the expression for Reflection coefficient of the perpendicular polarized wave incident obliquely on perfect dielectric medium.	10M	3	L2

17	Derive secondary constants of Transmission line in terms of primary constants.	10M	4	L2
OR				
18	Derive and explain the condition for minimum attenuation.	10M	4	L2
19	a) Determine the input impedance for $\lambda/4$ line impedance transformation. b) A lossless transmission line of 100Ω characteristic impedance is connected to a load of 300Ω . Find the reflection coefficient and voltage standing wave ratio.	5M 5M	5	L2
OR				
20	What is single stub matching? Find the length and location of the single stub to avoid the reflections from the load end.	10M	5	L2