O.P.Code: 23EC0407	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech. II Year II Semester Regular Examinations July/August-2025

EM WAVES AND TRANSMISSION LINES

(Electronics and Communications Engineering)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	Define position and displacement vectors?	CO1	L1	2M
	b	Define dielectric constant.	CO1	L1	2M
	c	An antenna radiates in free space and H= 50 Cos(1000t-5y)ax A/m. Calculate ω and β.	CO2	L2	2M
	d	Write the expression for Ampere's Force Law	CO2	L1	2M
	e	What is Brewster angle?	CO3	L1	2M
	f	Define skin depth.	CO3	L1	2M
	g	Write Distortion less condition	CO4	L1	2M
	h	List different types of transmission line	CO4	L1	2M
	i	State the average power of a transmission line.	CO5	L1	2M
	j	What is a matched line?	CO5	L1	2M

PART-B

(Answer all Five Units **5 x 10 = 50** Marks)

UNIT-I

2	a	Apply Gauss Law to evaluate the electric flux density at a point P due to the point charge located at the origin.	CO1	L3	5M
	b	Derive the expression for poisson's and laplace's equations.	CO1	L3	5M

OR

3	a	Point charges 1mC and -2mC are located at (3,2,1) and (-1,-1,4) respectively. Calculate the electric force on 10nC charge located at (0,3,1).	CO1	L4	5M
	b	Determine the Electric flux density at a point P due to infinite sheet of Charge using Gauss law.	CO1	L3	5M

UNIT-II

4	a	Define Displacement Current with expression.	CO2	L1	5M
	b	Determine the Magnetic Field intensity due to Infinite line Current by applying Ampere's Circuital law.	CO2	L3	5M

OR

5	a	Define Faraday's law. Determine the Transformer EMF for the time varying fields.	CO2	L3	5M
	b	Derive the energy density of magnetostatic field.	CO2	L3	5M

UNIT-III

6		Evaluate the expressions for reflection coefficient and transmission coefficient by a normal incident wave for a dielectric medium.	CO3	L4	10M

OR

7	a	Derive the expression for intrinsic impendence and propagation constant in a good conductor.	CO3	L3	5M
	b	Discuss about power and Poynting vector.	CO3	L2	5M

UNIT-IV

8	a	With neat sketch explain about Primary and Secondary constants of transmission line.	CO4	L3	5M
	b	Define and explain the different types of transmission lines used in communication systems.	CO4	L3	5M

OR

9	a	A transmission line with R = 0.1 Ω/m, L = 0.3 μH/m, C = 50 pF/m, and G = 0.01 S/m is operating at 1MHz. Calculate the characteristic impedance and propagation constant.	CO4	L4	5M
	b	Explain briefly about phase velocity and group velocity.	CO4	L2	5M

UNIT-V

10	a	Derive the expression for the input impedance of a lossless transmission line.	CO5	L3	5M
	b	A transmission line of characteristic impedance 50 Ω is terminated with a load of 100 Ω. Calculate the reflection coefficient at the load.	CO5	L3	5M

OR

11		Explain the Smith Chart and its use in transmission line problems.	CO5	L3	10M

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