

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
 (AUTONOMOUS)

B.Tech. II Year II Semester Supplementary Examinations December-2025
EM WAVES AND TRANSMISSION LINES
 (Electronics & Communications Engineering)

Time: 3 Hours**Max. Marks: 70****PART-A**(Answer all the Questions $10 \times 2 = 20$ Marks)

1	a	What are the co-ordinate systems? and write their co-ordinates.	CO1	L1	2M
	b	Define convection current and current density.	CO1	L1	2M
	c	Define inductance.	CO2	L1	2M
	d	Define Ampere's circuital Law	CO2	L1	2M
	e	What is total internal reflection?	CO3	L1	2M
	f	What is the difference between normal incidence and oblique incidence?	CO3	L1	2M
	g	What are the primary and secondary constants of transmission line?	CO4	L1	2M
	h	Define Transmission line	CO4	L1	2M
	i	Define VSWR.	CO5	L1	2M
	j	What is a matched line?	CO5	L1	2M

PART-B(Answer all Five Units $5 \times 10 = 50$ Marks)**UNIT-I**

2	a	Define Electric Potential. Find the electric potential for a point charge is located at origin and Write Maxwell's second equation for electrostatic field.	CO1	L3	5M
	b	Convert the following Cartesian points to cylindrical and spherical coordinates: i. P(2, 5, 1) ii. R(6, 2, -4)	CO1	L2	5M
	OR				
3	a	Define Coulomb's law and derive the force F that exists between two unlike charges.	CO1	L2	5M
	b	Define Electric field intensity and write its expression for N point charges.	CO1	L2	5M

UNIT-II

4	a	Define magnetic flux density and state Maxwell's Equations for static EM Fields.	CO2	L2	5M
	b	Determine the Magnetic Field Intensity due to a infinite sheet current.	CO2	L3	5M
	OR				
5	a	Determine the force on the current element due to the magnetic field.	CO2	L3	5M
	b	An infinitely filamentary wire carries a current of 2A in the +z direction. Calculate B at (-3,4,7).	CO2	L4	5M

UNIT-III

6	a	Given that $E = 40 (108 t - 3x)ayv/m$, Determine the direction of wave propagation, velocity of the wave, wave length.	CO3	L3	5M
	b	Derive the characteristics of plane wave in free space.	CO3	L3	5M

OR

7 a Evaluate the wave equation in lossy dielectric medium for sinusoidal time variations. CO3 L4 5M

b What is the relation between E and H in uniform plane wave? CO3 L1 5M

UNIT-IV

8 a Discuss about Transmission line Parameters. CO4 L3 5M

b Determine the equation for Characteristic Impedance of a Transmission line. CO4 L3 5M

OR

9 a Define a lossless transmission line. Derive the characteristics of a lossless transmission line. CO4 L3 5M

b Determine the propagation constant and velocity for the distortion less line from the following parameters at 2 GHz. $R=20 \Omega/\text{km}$, $L=4 \text{ mH/km}$, $C=0.02 \mu\text{F/km}$, $G=0.1 \text{ mS/km}$. CO4 L4 5M

UNIT-V

10 a What is VSWR? How is it related to the reflection coefficient? CO5 L2 5M

b Discuss the method of single stub matching. CO5 L3 5M

OR

11 a A 20 m long lossless transmission line with $Z_0 = 30\Omega$ operating at 2 MHz is terminated with a load $Z_L = 30 + j 30\Omega$. If $u = 0.6$ C on the line, find the reflection coefficient, the standing wave ratio S and the input impedance. CO5 L3 5M

b What are the criteria that make a line a low-loss transmission line? CO5 L2 5M

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