Chettinad College of Engineering & Technology
Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai.

Department of Electronics and Communication Engineering

EC8651 – Transmission Line and Waveguide

Unit I - MCQ Bank

1. Which of the following parameters is not a primary parameter?

a) Resistance

b) Attenuation constant

c) Capacitance

d) Conductance

Answer: b

Explanation: The primary parameters of a transmission line are the resistance, inductance, capacitance and conductance. The attenuation, phase and propagation constant are secondary parameters. Thus the odd one out is the attenuation constant.

2.The networks in which the R, L, C parameters are individually concentrated or lumped at discrete points in the circuit are called

a) Lumped

b) Distributed

c) Parallel

d) Paired

Answer: a

Explanation: The networks in which the R, L, C parameters are individually concentrated or lumped at discrete points in the circuit are called lumped networks. These networks can be identified definitely as representing a particular parameter. An example is the filters.

3.The lines having R, L, C distributed along the circuit are called

a) Lumped

b) Distributed

c) Parallel

d) Paired

Answer: b

Explanation: In distributed lines, the primary parameters are distributed along the circuit with each elemental length having its own values and the concentration of the individual parameters is not possible. An example is the transmission of power.

4.Which primary parameter is uniformly distributed along the length of the conductor?

a) G

b) C

c) L

d) R

Answer: d

Explanation: The resistance is a primary parameter that is uniformly distributed along the length of the conductor. It depends on the cross section area and the length of the conductor.

5.The primary parameter that is associated with the magnetic flux linkage is

a) R

b) L

c) C

d) G

Answer: b

Explanation: When the conductors carry current, the conductor will be surrounded and linked by magnetic flux. The flux linkages per ampere of current gives rise to the effect of inductance. It is denoted by L.

6. The primary parameter that is associated with the electric charges is

a) G

b) R

c) C

d) L

Answer: c

Explanation: Conductors separated by insulating dielectrics in order to store electric charges, gives rise to the capacitance effect. The capacitance is distributed in the whole conductor length.

7. The leakage current in the transmission lines is referred to as the

a) Resistance

b) Radiation

c) Conductance

d) Polarisation

Answer: c

Explanation: The dielectrics or insulators of the open wire line may not be perfect and a leakage current will flow. This leakage conductance exists between the conductors.

8.Find the receiving impedance of a transmission line having a voltage of 24V and a conduction current of 1.2A is

a) 25.2

b) 22.8

c) 28.8

d) 20

Answer: d

Explanation: By Ohm's law, the impedance is the ratio of the voltage to the current. On substituting for V = 24 and I = 1.2, we get Z = V/I = 24/1.2 = 20 units.

9. The characteristic impedance of a transmission line with impedance and admittance of 16 and 9 respectively is

a) 25

b) 1.33

c) 7

d) 0.75

Answer: b

Explanation: The characteristic impedance is given by Zo = √(Z/Y), where Z is the impedance and Y is the admittance. On substituting for Z = 16 and Y = 9, we get the characteristic impedance as √(16/9) = 1.33 units.

10. The propagation constant of a transmission line with impedance and admittance of 9 and 16 respectively is

a) 25

b) 144

c) 12

d) 7

Answer: c

Explanation: The propagation constant is given by γ = √(ZY), where Z is given by 9 and Y is 16. On substituting the given values, the propagation constant will be γ = √(ZY) = √(9 x 16) = 12 units.

11. Find the characteristic impedance expression in terms of the inductance and capacitance parameters.

a) Zo = √(LC)

b) Zo = LC

c) Zo = √(L/C)

d) Zo = L/C

Answer: c

Explanation: The characteristic impedance is given by the square root of the ratio of the inductance to the capacitance. Thus Zo = √(L/C) is the required expression.

12. When a transmission line has a load impedance same as that of the characteristic impedance, the line is said to be

a) Parallel

b) Perpendicular

c) Polarized

d) matched

Answer: d

Explanation: When transmission line load impedance is same as that of the characteristic impedance, the line is said to be matched. In such cases, full transmission of power will occur, with minimal losses.

13. The wavelength of a line with a phase constant of 6.28 units is

a) 2

b) 1

c) 0.5

d) 3.14

Answer: b

Explanation: The wavelength and the phase constant are related by $\lambda = 2\pi/\beta$, where β is given as 6.28. On substituting for β, we get $\lambda = 2\pi/6.28 = 1$ unit.

14. The wavelength of a wave with a frequency of 6 GHz in air is

a) 50

b) 5

c) 0.5

d) 0.05

Answer: d

Explanation: The wavelength is given by the ratio of the velocity to the frequency of the wave. In air medium, the velocity can be assumed as the speed of light. On substituting for v and f, we get $\lambda = v/f = 3\times10^8/6\times10^9 = 0.05$ units.

15. The phase constant of a wave with a wavelength of 2 units is given by

a) 2

b) 3.14

c) 6.28

d) 1

Answer: b

Explanation: The phase constant is given by $\beta = 2\pi/\lambda$. On substituting for $\lambda = 2$, we get $\beta = 2\pi/2 = 3.14$ units.

16. The frequency of a wave travelling in a transmission line with velocity 4 x 108 and wavelength 3 units is

a) 0.75 GHz

b) 0.133 GHz

c) 7.5 GHz

d) 1.33 GHz

Answer: b

Explanation: The frequency and wavelength relation is given by $f = v/\lambda$. On substituting for v and λ, we get $f = 4 \times 10^8/3 = 0.133$ GHz.

17. The velocity and phase constant relation is given by

a) $V = \omega/\beta$

b) $V = \omega\beta$

c) $V = \beta/\omega$

d) $V\omega\beta = 1$

Answer: a

Explanation: The velocity of a wave is the ratio of the frequency in radian/second to the phase constant. It is given by $V = \omega/\beta$.

18.Find the phase constant of a wave travelling with a velocity of 1.2 x 108 and a frequency of 7.5 giga radian/sec

a) 62.5

b) 26.5

c) 56.2

d) 52.6

Answer: a

Explanation: The phase constant is given by β = ω/v, from the definition of phase constant and velocity. On substituting for $\omega = 7.5 \times 10^9$ and $v = 1.2 \times 10^8$, we get the phase constant $\beta = 7.5 \times 10^9/1.2 \times 10^8 = 62.5$ units.

19. The electrical length in a transmission line refers to the

a) Product of attenuation constant and length

b) Ratio of attenuation constant and length

c) Product of phase constant and length

d) Ratio of phase constant and length

Answer: a

Explanation: The electrical length in a transmission line refers to the product of the attenuation constant α and the length of the line l. It is given by αl.

20.The unit of attenuation constant is

a) Decibel

b) Bel

c) Neper

d) No unit

Answer: c

Explanation: Attenuation constant is the measure of the power loss of the wave during its transmission.It is expressed in terms of neper and 1 neper= 8.686 decibel/m.

21. Which of the following parameters does not exist in the transmission line equation?

a) R

b) Zo

c) ZL

d) Propagation constant

Answer: a

Explanation: The transmission line equation consists of secondary parameters only, which are derived from the primary parameters. The propagation constant, load impedance and the characteristic impedance are related in the transmission line equation.

22. For an infinite transmission line, the characteristic impedance is given by 50 ohm. Find the input impedance.

a) 25

b) 100

c) 2500

d) 50

Answer: d

Explanation: From the transmission line equation, the infinite line will have an input impedance same as that of the characteristic impedance. Thus Zin = Zo for l->∞. This shows that the line will be matched. The input impedance for the given case is 50 ohm.

23. The best transmission length for effective transmission of power is

a) $L = \lambda/4$

b) $L = \lambda/8$

c) $L = \lambda/2$

d) $L = \infty$

Answer: b

Explanation: Maximum transmission of power will occur, when the transmission line is matched. This implies that the input and characteristic impedances are the same. This condition is possible for $l = \lambda/8$ and $l = \infty$. Since $l = \infty$ is not feasible, the best option is $l = \lambda/8$.

24. When the length of the transmission line is same as that of the wavelength, then which condition holds good?

a) Zin = Zo

b) Z = Zo

c) ZL = Zo

d) Zin = ZL

Answer: d

Explanation: When the transmission line has a length same as that of the wavelength of the wave propagating through it, the input impedance will be same as the load impedance. This is the case where the wave is not amplified. The transmission line acts as a buffer.

25. The input impedance of a half wave transmission line with a load impedance of 12.5 ohm is

a) 25

b) 50

c) 6.25

d) 12.5

Answer: d

Explanation: For a half wave transmission line L = $\lambda/2$, the input and the load impedances will be the same. Thus for the given data, the input impedance will be 12.5 ohm.