1. What is the lumped parameter equivalent of a transmission line?

a) RLC circuit
b) RC circuit
c) RL circuit
d) LC circuit

Answer: a) RLC circuit

Explanation: A transmission line can be represented by a lumped parameter equivalent circuit consisting of resistors (R), inductors (L), and capacitors (C) per unit length.

2. What do characteristic impedance and propagation constant define in a transmission line?

a) Attenuation
b) Voltage
c) Impedance matching
d) Wave propagation

Answer: c) Impedance matching

Explanation: Characteristic impedance and propagation constant define the impedance characteristics and signal propagation along the transmission line, crucial for impedance matching and signal integrity.

3. What does a distortion-less line imply?

a) No signal loss

b) No waveform distortion
c) No impedance mismatch
d) No signal reflection

Answer: b) No waveform distortion

Explanation: A distortion-less line implies that the transmitted waveform remains intact without distortion along the transmission line.

4. What does the reflection coefficient measure in a transmission line?

a) Attenuation
b) Phase shift
c) Signal loss
d) Signal reflection

Answer: d) Signal reflection

Explanation: The reflection coefficient quantifies the ratio of the reflected wave amplitude to the incident wave amplitude in a transmission line.

5. What is the purpose of a phase equalizer in a transmission line?

a) Reduce attenuation
b) Eliminate impedance mismatch
c) Compensate for phase distortion
d) Minimize signal reflection

Answer: c) Compensate for phase distortion

Explanation: A phase equalizer is used to correct phase distortion along the transmission line, ensuring the fidelity of the transmitted signal.

6. What parameter defines the location of a line fault in a transmission line?

a) Reflection coefficient
b) Attenuation
c) Impedance mismatch
d) Time delay

Answer: a) Reflection coefficient

Explanation: The reflection coefficient provides information about the impedance mismatch and can help locate faults in a transmission line based on variations in reflection.

7. Which circuit model is commonly used as an equivalent of a transmission line for analysis?

a) T-equivalent
b) π-equivalent
c) RLC circuit
d) RL circuit

Answer: b) π-equivalent

Explanation: The π-equivalent circuit model is often employed for transmission line analysis due to its simplicity and effectiveness.

8. What does the insertion loss measure in a transmission line?

a) Signal attenuation
b) Signal reflection
c) Phase distortion
d) Impedance mismatch

Answer: a) Signal attenuation

Explanation: Insertion loss quantifies the reduction in signal power as it passes through a transmission line due to attenuation.

9. In a coaxial cable, what component provides the primary mechanism for confining the electromagnetic fields?

a) Inner conductor
b) Dielectric material
c) Outer conductor
d) Insulating sheath

Answer: c) Outer conductor

Explanation: The outer conductor of a coaxial cable primarily serves to confine the electromagnetic fields within the cable, providing shielding and minimizing signal interference.

10. What factor determines the characteristic impedance of a transmission line?

a) Length of the line
b) Material composition
c) Frequency of operation
d) Cross-sectional area

Answer: b) Material composition

Explanation: The characteristic impedance of a transmission line is determined by factors such as the material composition, geometry, and arrangement of conductors.

11. What phenomenon does a short-circuited transmission line exhibit at the input end?

a) Maximum voltage
b) Maximum current
c) Minimum voltage
d) Minimum current

Answer: b) Maximum current

Explanation: A short-circuited transmission line at the input end results in maximum current due to the absence of impedance matching and signal reflection.

12. How does a transmission line with a high reflection coefficient affect signal transmission?

a) Increases signal fidelity
b) Reduces signal attenuation
c) Enhances impedance matching
d) Causes signal distortion

Answer: d) Causes signal distortion

Explanation: A high reflection coefficient indicates significant signal reflection, leading to signal distortion and degradation in the transmitted waveform.

13. What is the primary function of a transmission line equalizer?

a) Reduce signal attenuation
b) Minimize phase distortion
c) Compensate for impedance mismatch
d) Eliminate signal reflection

Answer: b) Minimize phase distortion

Explanation: A transmission line equalizer is primarily used to minimize phase distortion, ensuring the integrity of the transmitted signal waveform.

14. How does the length of a transmission line affect the propagation delay?

a) Longer lines have shorter delays
b) Shorter lines have longer delays
c) Longer lines have longer delays
d) Delay is independent of line length

Answer: c) Longer lines have longer delays

Explanation: Longer transmission lines introduce greater propagation delays due to the time taken for signals to travel along the extended length of the line.

15. What is the primary function of a coaxial cable’s dielectric material?

a) Confining electromagnetic fields
b) Providing mechanical support
c) Shielding against external interference
d) Preventing signal attenuation

Answer: b) Providing mechanical support

Explanation: The dielectric material in a coaxial cable primarily serves to provide mechanical support and insulation between the inner and outer conductors.

16. How does a mismatched characteristic impedance affect signal transmission in a transmission line?

a) Enhances signal fidelity
b) Reduces signal distortion
c) Increases signal attenuation
d) Minimizes signal reflection

Answer: c) Increases signal attenuation

Explanation: A mismatched characteristic impedance leads to signal reflection and increased signal attenuation along the transmission line.

17. What parameter characterizes the rate of signal decay along a transmission line?

a) Propagation constant

b) Reflection coefficient
c) Characteristic impedance
d) Attenuation coefficient

Answer: d) Attenuation coefficient

Explanation: The attenuation coefficient quantifies the rate at which the signal power decreases along the transmission line due to factors such as resistance and dielectric losses.

18. How does the cross-sectional area of a transmission line affect its characteristic impedance?

a) Larger area, lower impedance
b) Larger area, higher impedance
c) Smaller area, lower impedance
d) Smaller area, higher impedance

Answer: b) Larger area, higher impedance

Explanation: A larger cross-sectional area in a transmission line generally results in a higher characteristic impedance due to changes in the geometry and distribution of currents.

19. What parameter determines the velocity of signal propagation in a transmission line?

a) Frequency
b) Length
c) Material composition
d) Temperature

Answer: c) Material composition

Explanation: The velocity of signal propagation in a transmission line is primarily determined by the material composition, particularly the properties of the dielectric material separating the conductors.

20. How does the attenuation of high-frequency signals compare to low-frequency signals in a transmission line?

a) High-frequency signals experience higher attenuation
b) High-frequency signals experience lower attenuation
c) Attenuation is independent of frequency
d) Low-frequency signals experience higher attenuation

Answer: a) High-frequency signals experience higher attenuation

Explanation: High-frequency signals typically experience higher attenuation in a transmission line compared to low-frequency signals due to increased dielectric and conductor losses at higher frequencies.

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