Unit-IV

1.The scattering matrix is commonly represented by:

A) [Z]
B) [Y]
C) [S]
D) [H]

Answer: C) [S]

2. S-parameters are mainly used at:

A) Audio frequencies
B) Power frequencies
C) Microwave frequencies
D) DC circuits

Answer: C) Microwave frequencies

3. The scattering matrix relates:

A) Voltage and current
B) Incident and reflected waves
C) Resistance and reactance
D) Power and energy

Answer: B) Incident and reflected waves

4. For an N-port network, the S-matrix contains:

A) N elements
B) N^2 elements
C) 2N elements
D) N/2 elements

Answer: B) N^2 elements

5. The parameter S11 represents:

A) Transmission coefficient from Port 1 to Port 2
B) Reflection coefficient at Port 1
C) Reflection coefficient at Port 2
D) Output power

Answer: B) Reflection coefficient at Port 1

6. The parameter S21 represents:

A) Reflection at Port 1
B) Reflection at Port 2
C) Transmission from Port 1 to Port 2
D) Isolation

Answer: C) Transmission from Port 1 to Port 2

7. For a reciprocal network:

A) S12 = 0
B) S21 = 0
C) S12 = S21
D) S11 = 1

Answer: C) S12 = S21

8. For a lossless network, S-matrix is:

A) Singular
B) Diagonal
C) Unitary
D) Symmetric only

Answer: C) Unitary

9. For a matched port:

A) S11 = 1
B) S11 = 0
C) S21 = 0
D) S12 = 1

Answer: B) S11 = 0

10. The diagonal elements of an S-matrix represent:

A) Transmission coefficients
B) Reflection coefficients
C) Power gain
D) Isolation

Answer: B) Reflection coefficients

11. A directional coupler is a:

A) Four-port device
B) One-port device

C) Two-port device
D) Three-port device

Answer: A) Four-port device

12. The purpose of a directional coupler is:

A) Frequency generation
B) Sampling microwave power
C) Amplification
D) Oscillation

Answer: B) Sampling microwave power

13. In an ideal directional coupler, the isolated port receives:

A) Maximum power
B) Half power
C) No power
D) Full power

Answer: C) No power

14. The two-hole directional coupler uses:

A) Two apertures
B) Two loops
C) Two probes
D) Two ferrites

Answer: A) Two apertures

15. Bethe hole coupler uses:

A) Large apertures
B) Single small hole
C) Ferrite rod
D) Probe coupling

Answer: B) Single small hole

16. Directivity is the ratio of:

A) Input power to output power
B) Desired coupled power to undesired coupled power
C) Reflection to transmission
D) Frequency to wavelength

Answer: B) Desired coupled power to undesired coupled power

17. Coupling factor is measured in:

A) Volts
B) Watts
C) dB
D) Ohms

Answer: C) dB

18. An ideal directional coupler has:

A) Infinite directivity
B) Zero directivity
C) Unity directivity
D) Negative directivity

Answer: A) Infinite directivity

Magic Tee

19. Magic Tee is a combination of:

A) Two E-plane tees
B) Two H-plane tees
C) E-plane and H-plane tees
D) Two directional couplers

Answer: C) E-plane and H-plane tees

20. Magic Tee is a:

A) Three-port device
B) Four-port device
C) Two-port device
D) One-port device

Answer: B) Four-port device

21. The E-arm of a Magic Tee is also called:

A) Sum port
B) Difference port
C) Input port
D) Output port

Answer: B) Difference port

22. The H-arm of a Magic Tee is also called:

A) Difference port
B) Isolated port
C) Sum port
D) Coupled port

Answer: C) Sum port

23. In a Magic Tee, E-arm and H-arm are:

A) Coupled
B) Isolated
C) Short-circuited
D) Open-circuited

Answer: B) Isolated

Circulator

24. A circulator is a:

A) Reciprocal device
B) Non-reciprocal device
C) Active device
D) Oscillator

Answer: B) Non-reciprocal device

25. A circulator generally has:

A) One port
B) Two ports
C) Three or more ports
D) No ports

Answer: C) Three or more ports

26. In a three-port circulator, power entering Port 1 exits at:

A) Port 3
B) Port 2
C) Port 1
D) All ports

Answer: B) Port 2

27. Circulators are commonly made using:

A) Ferrites
B) Copper only
C) Aluminum only
D) Silicon

Answer: A) Ferrites

Microwave Bench

28. A microwave bench is used for:

A) DC measurements
B) Microwave measurements
C) Audio testing
D) Transformer testing

Answer: B) Microwave measurements

29. The microwave source in a bench setup is usually a:

A) BJT
B) Gunn diode
C) Transformer
D) SCR

Answer: B) Gunn diode

30. The function of an isolator is:

A) Amplification
B) Frequency multiplication
C) Prevent reflected power from reaching source
D) Detection

Answer: C) Prevent reflected power from reaching source

31. The wavemeter is used to measure:

A) Power
B) Frequency
C) VSWR
D) Impedance

Answer: B) Frequency

32. Detector mount converts microwave energy into:

A) Heat only
B) DC signal
C) AC signal only
D) RF power

Answer: B) DC signal

33. The slotted line section is used to measure:

A) Standing waves
B) Temperature
C) Voltage
D) Resistance

Answer: A) Standing waves

Fill in the Blanks

1.The scattering matrix is represented by the symbol _____.
Answer: S
2. S-parameters relate the _____ and reflected waves of a microwave network.
Answer: Incident
3. S11 represents the _____ coefficient at Port 1.
Answer: Reflection
4. S22 represents the reflection coefficient at Port _____.
Answer: 2
5.S21 represents the transmission coefficient from Port 1 to Port _____.
Answer: 2
6.S12 represents the transmission coefficient from Port 2 to Port _____.
Answer: 1
7.For a reciprocal network, S12 is equal to _____.
Answer: S21
8.For a matched network, S11 is equal to _____.
Answer: Zero
9.For a lossless network, the S-matrix is _____.
Answer: Unitary
10.The diagonal elements of an S-matrix represent _____ coefficients.
Answer: Reflection
11.The off-diagonal elements of an S-matrix represent _____ coefficients.
Answer: Transmission
12.S-parameters are widely used at _____ frequencies.
Answer: Microwave
13.An N-port network has _____ S-parameters.
Answer: N^2
14.The S-matrix simplifies microwave network _____.
Answer: Analysis

15. Scattering parameters are measured in terms of traveling _____.
Answer: Waves

16. A directional coupler is a _____-port device.
Answer: Four
17. A directional coupler is used to sample microwave _____.
Answer: Power
18. In an ideal directional coupler, the isolated port receives _____ power.
Answer: No
19.The coupling factor is measured in _____.
Answer: dB
20. Directivity is the ratio of desired coupled power to undesired coupled _____.
Answer: Power
21. A two-hole directional coupler uses two coupling _____.
Answer: Apertures

22.The Bethe-hole coupler uses a small coupling _____.
Answer: Hole
23.An ideal directional coupler has infinite _____.
Answer: Directivity
24. The isolated port ideally has _____ output.
Answer: Zero
25. Directional couplers are widely used for power _____.
Answer: Monitoring