1. The velocity factor of a transmission line depends on
   a) temperature
   b) skin effect
   c) **relative permittivity of dielectric**
   d) none of the above

2. A loss less line of characteristic impedance Z_0 is terminated in pure reactance of -jZ_0 value. VSWR is
   a) 10
   b) 2
   c) 1
   d) **Infinity**

3. In a klystron amplifier the input cavity is called
   a) **buncher**
   b) catcher
   c) Pierce gun
   d) Collector

4. In a circular waveguide the dominant mode is
   a) TE_{01}
   b) **TE_{11}**
   c) TE_{20}
   d) TE_{21}

5. The reflection coefficient on a line is 0.2 ∠45°. The SWR is
   a) 0.8

b) 1.1

c) 1.2

d) 1.5

6. Microwave resonators are used in

   a) microwave oscillators

   b) microwave narrow band amplifier

   c) microwave frequency metres

   d) all of the above

7. In a TWT the amplitude of resultant wave travelling down the helix

   a) increases exponentially

   b) increases linearly

   c) decreases exponentially

   d) is almost constant

8. Which of the following is not a travelling wave?

   a) $e = E_m \sin (\beta x - \omega t)$

   b) $e = E_m \cos (\beta x - \omega t)$

   c) $e = E_m \sin (\omega t - \beta x)$

   d) $e = E_m \sin (\beta x)$

9. In a directional coupler

   a) isolation (dB) equals coupling plus directivity

b) coupling (dB) equals isolation plus directivity

c) directivity (dB) equals isolation plus coupling

d) isolation (dB) equals (coupling) (directivity)

10. As the frequency is increased, the charging MVAR in a cable

    a) decreases

    b) increases

    c) remain the same

    d) decreases or remains the scheme

11. Loss angle of a good quality cable is about

    a) 1°

    b) 30°

    c) 70°

    d) 90°

12. In a three cavity klystron amplifier, the oscillations are excited in

    a) input cavity

    b) output cavity

    c) intermediate cavity

    d) both (a) and (b)

13. Which of the following devices uses a helix?

a) Klystron amplifier

b) Klystron oscillator

c) TWT

d) Both (a) and (b)

14. The diagram to show distance time history of electrons in klystron amplifier is called

   a) apple gate diagram

   b) asynchronous diagram

   c) bunching diagram

   d) velocity modulation diagram

15. The frequency of oscillation in a backward wave oscillator can be changed by

   a) varying the voltage which controls beam velocity

   b) varying the beam current

   c) both by varying the beam current and by light varying the voltage which controls beam velocity

   d) changing the rate of thermionic emission

16. The fabrication of microstrip line is done by

   a) photo etching

   b) printed circuit technique

   c) oxidation

17. The cut off wavelength in circular waveguide

   a) guide diameter

b) square of guide diameter

c) cube of guide diameter

d) square root of guide diameter

18. The directive gain of a transmitting antenna is proportional to

   a) its cross-sectional area

   b) square of cross-sectional area

   c) square root of cross-sectional area

   d) cube root of cross-sectional area

19. The correct sequence of parts in klystron amplifier are

   a) anode, catcher cavity, cathode, buncher cavity

   b) cathode, buncher cavity, catcher cavity, cavity

   c) anode, buncher cavity, catcher cavity, cathode

   d) cathode, catcher cavity, anode, buncher cavity

20. In a reflex klystron oscillator, repeller electrode is at

   a) low positive potential

   b) high positive potential

   c) negative potential

   d) zero potential

21. Which one of the following is transferred locking electron device C antenna?

   a) BARITT diode

   b) IMPATT diode

   c) Gunn diode

d) Step recovery diode

22. In microwave system the function of mode filter is

    a) to suppress modes with lower cut off frequencies

    b) to suppress modes with higher cut off frequencies

    c) to change mode of wave transmission (d)**both (b) and (c)**

23. The directive gain of a transmitting antenna is

    a) proportional to wavelength

    b) inversely proportional to wavelength

    c) proportional to square of wavelength

    d) inversely proportional to square of wavelength

24. A duplexer is used to

    a) couple two antennas to a transmitter

    b) isolate the antenna from the local oscillator

    c) prevent interference between two antennas connected to receiver

    d) use an antenna for reception or transmission without interference

25. In a backward wave oscillator the wave

    a) travelling along the line winds itself back and forth

    b) progresses only in forward direction

    c) progresses only in backward direction

    d) either (a) or (c)

26. A cavity resonator is

   a) a hollow metallic enclosure

   b) a hollow enclosure having magnetic material as its walls

   c) a hollow enclosure having dielectric material as its walls

   d) either (b) or (c)

27. Roughly the time required for microwave cooking as compared to conventional cooking is

   a) about twice

   b) about half

   c) about 10 times

   d) about one-tenth

28. When a reverse bias voltage exceeding the breakdown voltage is applied to an IMPATT diode, it results in:

   a) avalanche multiplication

   b) break down of depletion region

   c) high reverse saturation current

   d) none of the mentioned

29. If the length of the intrinsic region in IMPATT diode is 2 μm and the carrier drift velocity are 10^7 cm/s, then the nominal frequency of the diode is:

   a) 12 GHz

   b) 25 GHz

   c) 30 GHz

   d) 24 GHz

30. If the critical field in a Gunn diode oscillator is 3.2 KV/cm and effective length is 20 microns, then the critical voltage is:

   a) 3.2 V

   b) 6.4 V

   c) 2.4 V

   d) 6.5 V

31. Most of the wireless systems today operate at a frequency of about:

   a) 800 MHz

   b) 100 MHz

   c) 80 MHz

   d) None of the mentioned

32. In this method of wireless communication, communication happens only in one direction:

   a) Simplex

   b) Duplex

   c) Half duplex

   d) None of the mentioned

33. If the distance between a transmitting station and receiving station is 1 Km and if the antennas are operating at a wavelength of 5 cm, then the path loss is:

   a) 108 dB b) 12 dB c) 45 dB d) 48 dB

34. The amount of power by which the received power must be greater than the threshold level required to maintain a minimum quality of service is called _____

    a) Line loss b) Link budget **c) Link margin** d) None of the mentioned

35. Unloaded Q of a rectangular waveguide cavity resonator:

    a) Does not exist

    b) Defined as the ratio of length of the waveguide to breadth of the waveguide

    c) Defined as the ratio of stored energy to the power dissipated in the walls

    d) None of the mentioned

36. Find the wave number of a rectangular cavity resonator filled with a dielectric of 2.25 and designed to operate at a frequency of 5 GHz.

    a) 157.08

    b) 145.2

    c) 345.1

    d) 415.08

37. If the loss tangent of a rectangular waveguide is 0.0004, then Q due to dielectric loss is:

    a) 1250

    b) 2450

    c) 2500

    d) 1800

38. The radar in which both transmission and reception is done using the same antenna are called:

    a) Monostatic radar

    b) Bistatic radar

    c) Monopole radar

    d) Dipole radar

39. The criterion on which oscillations are produced in the oscillator circuit is called:

    a) Shannon's criteria

    b) Barkhausen criteria

    c) Colpitts criteria

    d) None of the mentioned

40. Power dividers and couplers are _____ microwave components used for power division or power combining.

    a) Passive b) Active c) Linear d) Non linear

41. T- junction is an example for:

    a) 2 port network

    b) 3 port network

    c) 4 port network

    d) None of the mentioned

42. If a device is passive and contains no anisotropic elements, then the device is_____

    network.

    a) Reciprocal

    b) Non reciprocal

    c) Lossless

    d) Lossy

43. Scattering matrix of a reciprocal network is:

    a) Symmetric

    b) Asymmetric

    c) Identity matrix

    d) Null matrix

44. If a microwave network is lossless, then S matrix of the microwave network is:

    a) Unitary

    b) Symmetric

    c) Identity matrix

    d) Zero matrix

45. Isolation of a directional coupler is a measure of the:

    a) Power delivered to the uncoupled port

    b) Power delivered to the coupled port

    c) Power delivered to the second port

    d) None of the mentioned

46. Forward attenuation provided by a resonance ferrite isolator is:

    a) Zero

    b) Low

    c) High

    d) None of the mentioned

47. The isolators constructed using ferrite materials must operate at:

    a) Gyro magnetic resonance b) Magnetic resonance

c) Isolator resonance

d) None of the mentioned

48. The attenuation of a _____ is very large near the gyro magnetic resonance of the ferrite.

a) Linearly polarized wave

b) Circularly polarized wave

c) Left polarized wave

d) Right polarized wave

49. The length of a ferrite slab required operating with a minimum forward insertion loss and 30 dB reverse attenuation and the reverse attenuation at this point is:

a) 3 cm

b) 2.4 cm

c) 4 cm

d) 3.6 cm

50. The electric field distribution of the forward and reverse waves in a ferrite slab-loaded waveguide is quite different. This property is used in:

a) Field displacement resonator

b) Resonance isolator

c) Waveguide isolator

d) None of the mentioned

51. The major advantage of single stub tuning over other impedance matching techniques is:

a) Lumped elements are avoided

b) It can be fabricated as a part of transmission line media

c) It involves two adjustable parameters

d) All of the mentioned

52. Shunt stubs are preferred for:

a) Strip and microstrip lines

b) Coplanar waveguides

c) Circular waveguide

d) Circulators

53. The two adjustable parameters in single stub matching are distance 'd' from the load to the stub position, and _____

a) Susceptance or reactance provided by the stub

b) Length of the stub

c) Distance of the stub from the generator

d) None of the mentioned

54. In shunt stub matching, the key parameter used for matching is:

   a) Admittance of the line at a point

   b) Admittance of the load

   c) Impedance of the stub

   d) Impedance of the load

55. For co-axial lines and waveguides, _____ is more preferred.

   a) Open circuited stub

   b) Short circuited stub

   c) Slotted section

   d) Co-axial lines cannot be impedance matched

56. For a load impedance of ZL=60-j80. Design of 2 single-stub shunt tuning networks to match this load to a 50Ω line is to be done. What is the normalized admittance obtained so as to plot it on smith chart?

   a) 1+j

   b) 0.3+j0.4

   c) 0.4+j0.3

   d) 0.3-j0.4

57. After impedance matching, if a graph is plot with frequency v/s reflection co-efficient of the transmission line is done, then at the frequency point for which the design is done, which of the following is true?

   a) There is a peak at this point of the curve

   b) There is a dip at this point of the curve

   c) The curve is a straight line

   d) Such a plot cannot be obtained

58. The simplest method of reducing the forbidden range of impedances is:

   a) increase the distances between the stubs

   b) reduce the distance between the stubs

   c) increase the length of the stubs

   d) reduce the length of the stubs

59. The standard stub spacing usually used is:

   a) 0, λ/2 b) λ/4, λ/8 **c) λ/8, 3λ/8**

   d) none of the mentioned

60. If an antenna has a directivity of 16 and radiation efficiency of 0.9, then the gain of the antenna is:

a) **16.2**

b) 14.8

c) 12.5

d) 19.3

61. A rectangular horn antenna has an aperture area of $3\lambda \times 2\lambda$. Then the maximum directivity that can be achieved by this rectangular horn antenna is:

a) 24 dB

b) 4 dB

c) **19 dB**

d) Insufficient data

62. If an antenna has a directivity of 16 and is operating at a wavelength of λ, then the maximum effective aperture efficiency is:

a) **$1.27\lambda^2$**

b) $2.56\lambda^2$

c) $0.87\lambda^2$

d) None of the mentioned

63. A resistor is operated at a temperature of 300 K, with a system bandwidth of 1 MHz then the noise power produced by the resistor is:

a) 3.13×10^{-23} watts

b) **4.14×10^{-15} watts**

c) 6.14×10^{-15} watts

d) None of the mentioned

64. With an increase in operating frequency, the background noise temperature:

a) **Increases**

b) Decreases

c) Remains constant

d) Remains unaffected

65. The noise temperature of an antenna is given by the expression:

a) **radTb + (1-rad) Tp**

b) (1-rad) TP

c) radTb

d) None of the mentioned

66. Dipole antennas are an example for:

   a) Wire antennas b) Aperture antennas

   c) Array antennas

   d) None of the mentioned

67. A parabolic reflector used for reception with the direct broadcast system is 18 inches in diameter and operates at 12.4 GHz. The far-field distance for this antenna is:

   a) 18 m

   b) 13 m

   c) 16.4 m

   d) 17.3 m

68. Antennas having a constant pattern in the azimuthal plane are called _____

   a) High gain antenna

   b) Omni directional antenna

   c) Unidirectional antenna

   d) Low gain antenna

69. If the beam width of an antenna in two orthogonal planes are 30^0 and 60^0. Then the directivity of the antenna is:

   a) 24

   b) 18

   c) 36

   d) 12