

Microwave Communications - MCQs (1-300)

1. _____ is the progressive decrease of signal strength with increasing distance.

- A. Radiation
- B. Attenuation
- C. Modulation
- D. Propagation

2. Calculate the effective earth's radius if the surface refractivity is 301.

- A. 8493 km
- B. 8493 mmi
- C. 6370 km
- D. 6370 mi

3. If k-factor is greater than 1, the array beam is bent

- A. Away from the earth
- B. towards the ionosphere,
- C. towards the earth
- D. towards the outer space

4. the antenna separations (in meters) required for optimum operation of a space diversity system can be calculated from:

- A. $S = 2\lambda R/L$
- B. $S = 3\lambda R/L$
- C. $S = \lambda R/RL$
- D. $S = \lambda R/L$

where R = effective earth radius (m) and L = path length (m)

5. Rainfall is an important factor for fading of radio waves at frequencies above

- A. 10 GHz
- B. 100 GHz
- C. 1 GHz
- D. 100 MHz

6. Theoretically electromagnetic radiation field strength varies in inverse proportion to the square of the distance, but when atmospheric attenuation effects and the absorption of the terrain are taken into account the attenuation can be as high as the inverse _____ power of the distance.

- A. Third
- B. Fourth
- C. Fifth
- D. Sixth

7. What do you call an attenuation that occurs over many different wavelengths of the carrier?

- A. Rayleigh fading
- B. Rician fading
- C. Wavelength fading
- D. Slow fading

8. Which of the reception problems below that is not due to multipath?

- A. Delayed spreading
- B. Rayleigh fading
- C. Random Doppler shift
- D. Slow fading

9. Which causes multipath or frequency-selective fading?

- A. Small reflector
- B. Nearer reflector
- C. Further reflector
- D. Large reflector

10. In microwave transmission using digital radio, what causes most intersymbol interference?

- A. Delayed spreading
- B. Rayleigh fading
- C. Random Doppler shift
- D. Slow fading

11. A shipboard equipment which measures the distance between the ship's bottom and the ocean floor.

- A. Fathometer
- B. Echosounder
- C. LORAN
- D. SONAR

12. The cavity resonator

- A. Is equivalent to an LC resonant circuit
- B. In a reflect klystron has its output taken from the reflector plate
- C. Produces a frequency which is independent of the cavity size.
- D. Has a low Q factor for narrow operation.

13. At what position is the input signal inserted into a traveling-wave tube?

- A. At the cathode end of the helix
- B. At the collector

- C. At the collector end of the helix
- D. At the control grid of the electron gun

14. Coupling into and out of a traveling-wave tube can be accompanied by a

- A. Waveguide match
- B. Cavity match
- C. Direct coax-helix match
- D. All of the above

15. a high-power microwave pulse of the order of megawatts can be generated by a

- A. traveling-wave tube
- B. magnetron
- C. reflex klystron
- D. Gunn diode

16. A traveling-wave tube (TWT) amplifies by virtue of

- A. The absorption of energy by the signal from an electron stream
- B. The effect of an external magnetic field
- C. The energy contained the cavity resonators
- D. The energy liberated form the collector

17. What is the purpose of the electromagnetic field which surrounds a traveling-wave tube?

- A. To accelerate the electron
- B. To velocity modulate the electron beam

- C. To keep the electrons from spreading out
- D. To slow down the signal on the helix

18. Which of the following is used as an oscillator device in the SHF band?

- A. Thyatron tube
- B. Tunnel diode
- C. Klystron tube
- D. Both B and C

19. Microwave frequencies are normally regarded as those in the range of

- A. 1 to 500 MHz
- B. 1000 to 10,000 GHz
- C. 1 to 100 GHz
- D. 10 to 1000 GHz

20. The highest frequency which a conventional vacuum-tube oscillator can generate is not limited by the

- A. Electron transit time
- B. Distributed lead inductance
- C. Inter-electrode capacitance
- D. Degree of emission from the cathode

21. As the electron beam moves through a klystron's intercavity drift space

- A. Frequency modulation at the input cavity creates velocity modulation at the output cavity
- B. Velocity modulation at the input cavity creates density modulation at the output cavity

- C. Density modulation at the input cavity creates velocity modulation at the output cavity
- D. Phase modulation at the input cavity creates velocity modulation at the output cavity.

22. The frequency of the oscillation generated by a magnetron, is mainly determined by

- A. The flux density of the external magnet
- B. The ratio of the dc cathode voltage to the magnetic flux density
- C. The number of the cavity resonators
- D. The dimension of each cavity resonator

23. If the instantaneous RF potentials on the two sides of a magnetron cavity are of opposite polarity, the operation is in the

- A. π mode
- B. $\pi/2$ mode
- C. 2π mode
- D. $\pi/4$ mode

24. The Gunn diode oscillator

- A. Is capable of generating continuous microwave power of the order of kilowatt
- B. Generates frequencies which are below 100 MHz
- C. Operates over a positive resistance characteristic
- D. Depends on the formation of charge domain

25. What ferrite device can be used instead of duplexer of isolate microwave transmitter and receiver when both are connected to the same antenna?

- A. Isolator
- B. Magnetron
- C. Simplex
- D. Circulator

26. To achieve good bearing resolution when using a pulsed-radar set, an important requirement is

- A. A narrow, antenna-beam width in the vertical plane
- B. A narrow, antenna-beam width in the horizontal plane
- C. A low repetition rate
- D. A high duty cycle

27. When used in conjunction with a radar set, the purpose of an echo box is to provide an artificial target.

- A. Which may be used to tune the radar synchronizer
- B. Which may be used to tune the radar receiver
- C. To the tone of the pulse repetition
- D. Tune the magnetron to the correct frequency

28. In a radar-set receiver, the usual mixer stage is

- A. And FET
- B. A tunnel diode
- C. A silicon crystal
- D. A Rochelle salts crystal

29. Klystron oscillators are most often used in the frequency range of

- A. 300 to 3000 MHz
- B. 3000 to 30000 MHz
- C. 30 to 30000 MHz
- D. 10 to 10000 MHz

30. Oscillators of a klystron tube are maintained

- A. By bunches of electrons passing the cavity grids
- B. By plate-to-cathode feedback
- C. By feedback between the accelerating grid and the repeller
- D. By circulating bunches of electrons within the cavities.

31. What allow microwave to pass in only one direction?

- A. RF emitter
- B. Capacitor
- C. Varactor-triac
- D. Ferrite emitter

32. In an SHF pulsed radar set, a reflex klystron can be used as a

- A. Single mixer stage
- B. Local oscillator
- C. Transmitter oscillator
- D. Duplexer stage

33. A Class-S Emergency Position-Indicating Radio Beacon (E.P.I.R.B)

- A. Must be capable of floating or being secured to a survival
- B. Must have its battery replaced after emergency use

- C. May be tested during the first five minutes of any hour
- D. All of these

34. A PPI cathode-ray tube as used on a radar set

- A. Is used to check the percentage of modulation
- B. Indicates both the range and azimuth of a target
- C. Indicates only the range of a target
- D. Is used for receiver alignment

35. The resonant frequency of a cavity resonator depends upon

- A. The mode of operation
- B. Its electrical dimensions
- C. Its physical dimensions
- D. The capacitor which tunes it

36. The maximum usable range of the usual radar set (on any particular range setting) is determined by

- A. The width of the transmitted pulses
- B. The interval between transmitted pulses
- C. The bandwidth of the receiver IF stages
- D. The duty cycle

37. A reflex klystron is oscillating at the frequency of its resonant cavity. If the reflector voltage is made slightly less negative, the

- A. Oscillation will cease
- B. Output power would increase
- C. The frequency will decrease

- D. Bunching would occur earlier in time

38. The coarse frequency adjustment of a reflex klystron is accomplished by

- A. The AFC system
- B. Adjusting the flexible wall of the resonant cavity
- C. An adjustment in the synchronizer
- D. Varying the repeller voltage

39. In a pulsed radar set, the STC circuit is used to

- A. Improve the target bearing resolution
- B. Increases receiver sensitivity for echoes from targets
- C. Vary the pulse frequency in order to control the maximum target
- D. Reduce interference from the effects of sea return

40. In a pulsed radar set, the function of the duplexer is to

- A. Aid in calibrating the display unit
- B. Prevent frequency drift in the klystron
- C. Allow the transmitter and the receiver to operate from a common antenna
- D. All of these

41. A magnetron is operated at a duty cycle of 0.001. It has a peak power output of 100 kilowatts. Its average power is

- A. 10,000 watts

- B. 100 watts
- C. 1,000 watts
- D. 1,000,000 watts

42. The aquadag coating on the inside of PPI tube is used

- A. To focus the beam of primary electrons
- B. To shield the electron beam from unidirectional magnetic
- C. As a second anode and to prevent the build-up of secondary field
- D. All of these

43. If the duration of the radar transmitted pulse, on a particular range of operation, is increased, the required bandwidth of the receiver's IF amplifiers

- A. Must remain as before
- B. Must be increased
- C. May be decreased
- D. Must be doubled

44. The main frequency determining element of a klystron is

- A. The repeller voltage
- B. The accelerating voltage
- C. Its resonant cavity
- D. Its mode of operation

45. A thin layer of dirt and grime covers the reflecting surface of the parabolic dish of a radar set. The particular effect on the performance of the radar will be

- A. A decrease in range

- B. A reduction in horizontal resolution
- C. No noticeable effect
- D. A decrease in gain

46. Which of the following permits a microwave signal to travel in one direction with virtually no loss, but severely attenuates any signal attempting to travel in the reverse direction?

- A. Isolator
- B. Wave trap
- C. Tunnel diode
- D. Circulator

47. It is possible to increase the maximum range of a radar equipment by

- A. Lowering the pulse frequency
- B. Raising the peak power of the transmitter
- C. Narrowing the beam width and increasing the pulse duration
- D. All of these

48. When it is desired that short-range targets be clearly seen on a pulsed-radar set, it is important that the receiver and display system have

- A. A long time constant
- B. Low-pass filters
- C. The shortest possible time
- D. The restricted high-frequency response

49. Which of the following is used as a high power microwave oscillator?

- A. Thyatron

- B. Magnetron
- C. Klystron
- D. Reflex-klystron

50. Which of the following operating frequencies is used for the modern loran navigational system?

- A. Loran C: 100 kHz
- B. Loran D: 10.2 kHz
- C. Loran A: 1950 kHz
- D. Loran B: 900 kHz

51. Which ferrite device can be used instead of a duplexer to isolate a microwave transmitter and receiver when both are connected to the same antenna?

- A. Isolator
- B. Magnetron
- C. Simplex
- D. Circulator

52. The pulse frequency is equal to

- A. Duty cycle/pulse width
- B. The reciprocal of the pulse repetition rate
- C. Pulse width x peak power/average power
- D. All of these

53. In a radar set, a blocking oscillator can be used to

- A. Act as the local oscillator converter stage
- B. Provide the sweep voltage for the PPI tube

- C. Produce a trigger pulse for the transmitter
- D. As a single local oscillator converter stage

54. The intensity of the echoes (target definition) on a PPI display is determined by the

- A. Radio frequency
- B. Pulse frequency and antenna rotation rate
- C. Duty cycle
- D. Average power

55. A duplexer circuit allows a transmitter and a receiver to operate from the same antenna with virtually no interaction. This circuit may be replaced by a (an)

- A. loss waveguide
- B. circulator
- C. isolator
- D. gyrator

56. Which of the following frequencies are used by a class-C Emergency Position-Indicating Radio Beacon (E.P.I.R.B)?

- A. 156.65 MHz
- B. 121.5 MHz
- C. 156.76 MHz and 156.8 MHz
- D. All of these

57. The repetition rate of a pulsed radar system indicates the

- A. Frequency of the range-marker oscillator
- B. Reciprocal of the duty cycle

- C. Number of target echoes received on one second
- D. Frequencies of the duty cycle

58. The radar set, sensitivity-time control circuit

- A. Controls the width of the magnetron pulse
- B. Is used to increase sea return
- C. Can reduce sea-return response
- D. Discriminates between targets that are very close together.

59. Which of the following is the ferrite device that buffers a microwave source from the effects of a varying load, and thereby prevents the formation of standing waves?

- A. Circulator
- B. Duplexer
- C. Isolator
- D. Diplexer

60. Pulsed radar sets are primarily used to find the

- A. Target's range and bearing
- B. Size and speed of a target
- C. Speed and course of a target
- D. Target's range of speed

61. Which of the following factors is mainly concerned in the design of an antenna system for pulsed radar set?

- A. Duty cycle
- B. Radio frequency
- C. Pulse frequency
- D. Pulse length

62. In a radar set receivers, an ac AFC system may be used to

- A. Automatically maintain the correct magnetron frequency
- B. Keep the IF stages on frequency
- C. Maintain the desired klystron frequency
- D. Provide automatic control of receiver gain

63. The input signal is introduced into the traveling-wave tube at the

- A. Cathode
- B. Anode
- C. Cathode end of the helix
- D. Collector end of the helix

64. The display on the PPI scope of a radar set will have greater intensity under the following conditions

- A. Higher antenna rotation speeds
- B. Lower pulse repetition rate
- C. Lower antenna rotation speeds
- D. Both lower antenna rotation speeds and higher pulse repetition

65. The operating frequency of loran C lies within the

- A. LF band
- B. VLF band
- C. MF band
- D. HF band

66. The PPI tubes have an aquadag coating on the inside of the tube. The purpose of this coating is

- A. To act as the second anode
- B. To shield the tube magnetically
- C. To decelerate the electron beam
- D. To deflect the electron beam

67. A traveling-wave tube is used at frequencies in the order of

- A. 30 MHz
- B. 300 MHz
- C. 8000 MHz
- D. 100 MHz

68. The main benefit of using microwaves is

- A. Lower-cost equipment
- B. Simpler equipment
- C. Greater transmission distances
- D. More spectrum space for signals

69. Radio communication are regulated in the Philippines by the

- A. DOTC
- B. KBP
- C. NTC
- D. Department of Defense

70. Which of the following is not a disadvantage of microwaves?

- A. Higher-cost equipment
- B. Line-of-sight transmission
- C. Conventional components are not usable
- D. Circuits are more difficult to analyze

71. Which of the following is a microwave frequency?

- A. 1.7 MHz
- B. 750 MHz
- C. 0.98 GHz
- D. 22 GHz

72. Which of the following is not a common microwave application?

- A. Radar
- B. Mobile radio
- C. Telephone
- D. Satellite communications

73. Coaxial cable is not widely used for long microwave transmission lines because of its

- A. High loss
- B. High cost
- C. Large size
- D. Excessive radiation

74. Stripline and microstrip transmission lines are usually made with

- A. Coax
- B. Parallel wires
- C. Twisted pair
- D. PCBs

75. The most common cross section of a waveguide is a

- A. Square
- B. Circle
- C. Triangle
- D. Rectangle

76. A rectangular waveguide has a width of 1 inch and a height of 0.6 in. Its cutoff frequency is

- A. 2.54 GHz
- B. 3.0 GHz
- C. 5.9 GHz
- D. 11.8 GHz

77. A waveguide has a cutoff frequency of 17 GHz. Which of the following signals will not be passed by the waveguide?

- A. 15 GHz
- B. 18 GHz
- C. 22 GHz
- D. 255 GHz

78. Signal propagation in a waveguide is by

- A. Electrons
- B. Holes
- C. Electric and magnetic fields
- D. Air pressure

79. When the electric field in a waveguide is perpendicular to the direction of wave propagation, the mode is said to be

- A. Vertical polarization
- B. Horizontal polarization
- C. Transverse electric
- D. Transverse magnetic

80. The dominant mode in most rectangular waveguide is

- A. $TE_{1,0}$
- B. $TE_{1,2}$
- C. $TM_{0,1}$
- D. $TM_{1,1}$

81. A magnetic field is introduced into waveguide by a

- A. Probe
- B. Dipole
- C. Stripline
- D. Capacitor

82. A half-wavelength, close section of a waveguide that acts as a parallel resonant circuit is known as a(n)

- A. Half-wave section
- B. Cavity resonator
- C. LCR circuit
- D. Directional coupler

83. Decreasing the volume of a cavity causes its resonant frequency to

- A. Increase
- B. Decrease
- C. Remain the same
- D. Drop to zero

84. _____ is a popular microwave mixer diode.

- A. Gunn
- B. Varactor
- C. Hot carrier
- D. IMPATT

85. Varactor and step-recovery diodes are widely used in what type of circuit?

- A. Amplifier
- B. Oscillator
- C. Frequency multiplier
- D. Mixer

86. Which diode is a popular microwave oscillator?

- A. IMPATT
- B. Gunn
- C. Varactor
- D. Schottky

87. Which type of diodes does not ordinarily operate with reverse bias?

- A. Varactor
- B. IMPATT
- C. Snap-off
- D. Tunnel

88. Low-power Gunn diodes are replacing

- A. Reflex klystrons
- B. TWTs
- C. Magnetrons
- D. Varactor diodes

89. Which of the following is not a microwave tube?

- A. Traveling-wave tube
- B. Cathode-ray tube
- C. Klystron
- D. Magnetron

90. In a klystron amplifier, velocity modulation of the electron beam is produced by the

- A. Collector
- B. Catcher cavity
- C. Cathode
- D. Buncher cavity

91. A reflex klystron is used as a(n)

- A. Amplifier
- B. Oscillator
- C. Mixer
- D. Frequency multiplier

92. For proper operation, a magnetron must be accompanied by a

- A. Cavity resonator
- B. Strong electric field
- C. Permanent magnet
- D. High dc voltage

93. The operating frequency of klystrons and magnetrons is set by the

- A. Cavity resonators
- B. DC supply voltage
- C. Input signal frequency
- D. Number of cavities

94. A magnetron is used only as a/an

- A. Amplifier
- B. Oscillator
- C. Mixer
- D. Frequency multiplier

95. A common application for magnetron is in

- A. Radar
- B. Satellites
- C. Two-way radio
- D. TV sets

96. In a TWT, the electron beam is density-modulated by a

- A. Permanent magnet
- B. Modulation transformer
- C. Helix
- D. Cavity resonator

97. The main advantage of a TWT over a klystron for microwave amplification is

- A. Lower cost
- B. Smaller size
- C. Higher power
- D. Wider bandwidth

98. High-power TWTs are replacing what in microwave amplifiers?

- A. MESFETs
- B. Magnetrons
- C. Klystrons
- D. IMPATT diodes

99. The most widely used microwave antenna

- A. Half-wave dipole
- B. Parabolic
- C. Hyperbolic
- D. Horn

100. _____ is a measure of reliability expressed as the average number of hours between successive failures.

- A. MTBF
- B. MTTR
- C. Downtime

- D. Outage time

101. The free space attenuation between two microwave antennas 40 km apart operating at 8 GHz is

- A. 146.7 dB
- B. 142.55 dB
- C. 82.5 dB
- D. 86.7 dB

102. An active microwave radio repeater that can provide drops and inserts.

- A. Broadband repeater
- B. Baseband repeater
- C. IF repeater
- D. RF repeater

103. If the correction factor k equals $4/3$ of the earth's curvature, the microwave beam would have a curvature that is _____ than that of the earth.

- A. More
- B. Less
- C. Equal
- D. Not related

104. The optimum clearance from an obstacle in an microwave system is accepted as _____ of the first fresnel zone radius.

- A. 0.6
- B. 0.5
- C. 0.9
- D. 1.5

105. The microwave beam curves the same than that of the earth when the value of the correction factor k equals

- A. 0

- B. 4/3
- C. 2/3
- D. Infinity

106. The time from the transmission of a radar pulse to its reception is 0.12 ms. The distance to the target is how many nautical miles?

- A. 4.85 nmi
- B. 9.7 nmi
- C. 11.2 nmi
- D. 18.4 nmi

107. The ability of a radar to determine the bearing to a target depends upon the

- A. Antenna directivity
- B. Speed of light
- C. Speed of the target
- D. Frequency of the signal

108. The pulse duration of a radar signal is 699ns. The PRF is 185 pulses per second. The duty cycle is

- A. 0.216 %
- B. 0.130 %
- C. 0.013 %
- D. 0.407 %

109. The Doppler effect allows which characteristics of a target to be measured?

- A. Distance
- B. Azimuth
- C. Altitude
- D. Speed

110. The Doppler effect is a change in what signal characteristics produced by

relative motion between the radar set and a target?

- A. Amplitude
- B. Phase
- C. Frequency
- D. Duty cycle

111. The most widely used radar transmitter component is a

- A. Klystron
- B. Magnetron
- C. TWT
- D. Power transistor

112. Low-power radar transmitters and receivers use which component?

- A. GaAs FET
- B. Magnetron
- C. Gunn diode
- D. Klystron

113. What component in a duplexer protects the receiver from the higher transmitter output?

- A. Waveguide
- B. Bandpass filter
- C. Notch filter
- D. Spark gap

114. Most radar antennas use a

- A. Dipole
- B. Broadside array
- C. Horn and parabolic reflector
- D. Collinear array

115. The most common radar display is the

- A. A scan
- B. Color CRT
- C. LCD
- D. PPI

116. A radar antenna using multiple dipoles or slot antennas in a matrix with variable phase shifters is called a/an

- A. A scan
- B. Phased array
- C. Broadside
- D. Circulator polarized array

117. Which of the following is a typical radar operating frequency?

- A. 60 MHz
- B. 450 MHz
- C. 900 MHz
- D. 10 GHz

118. A microwave system requires the use of repeaters when

- A. The intervening terrain is favorable
- B. The distances involved are greater
- C. The required reliability is met
- D. The radio fading is unacceptable

119. Are transmission lines which convey electromagnetic waves in highest frequencies

- A. Twisted pair of telephone wires
- B. Waveguides
- C. Power lines
- D. Coaxial cables

120. A microwave band of 10.9 to 36. GHz is considered as

- A. C-band
- B. X-band
- C. Q-band
- D. K-band

121. A microwave communications system space loss calculation formula.

- A. $94.2 + 20 \log f + 20 \log d$
- B. $92.4 + 20 \log f + 20 \log d$
- C. $94.2 + 10 \log f + 20 \log d$
- D. $92.3 + 10 \log f + 20 \log d$

122. A waveguide is also a

- A. Low pass filter
- B. High pass filter
- C. Band pass filter
- D. Band stop filter

123. A method of diversity reception where the signal is transmitted on two different frequencies over the same path

- A. Space diversity
- B. Frequency diversity
- C. Polarization diversity
- D. Wavelength diversity

124. A wire used to reduce the skin effect

- A. AWG # 14
- B. AWG # 15
- C. Copper wire
- D. Litz wire

125. Space diversity transmission means transmitting and receiving on two or more.

- A. Different frequencies
- B. Antennas operating on two different frequencies
- C. Antennas operating on the same frequencies
- D. Identical frequencies

126. The best system configuration to overcome multipath fading of microwave system over the water

- A. Space diversity
- B. Frequency diversity
- C. Polarization diversity
- D. Wavelength diversity

127. When the value of k increases, the effective result is _____ of the equivalent curvature

- A. Flattening
- B. Bulging
- C. Sharp curvature
- D. All of these

128. A traveling wave tube consists of

- A. Electron gun, helix and repeller
- B. Electron gun, helix and collector
- C. Electron gun, repeller and collector
- D. Buncher cavity and catcher cavity

129. Advantage of periscope antenna in microwave

- A. Reduce tower height
- B. Minimize interference to and from other neighboring stations
- C. Shorten waveguide length
- D. Easy to install

130. What is the cut-off frequency of a waveguide?

- A. The highest frequency the waveguide operates
- B. The lowest frequency the waveguide operates
- C. The same as the operating frequency
- D. The only frequency the waveguide operates.

131. When the clearance above the obstruction is equal to the radii of even fresnel zones at the point of reflection. The RSL is

- A. Increased
- B. Decreased
- C. Constant
- D. Above threshold

132. What is the wavelength of a wave in a waveguide?

- A. Greater than in free space
- B. Depends only on the waveguide dimensions and the free-space wavelength
- C. Inversely proportional to the phase velocity
- D. Inversely proportional to the group velocity

133. The CCIR hypothetical reference circuit covering a distance of 25000 km consists of a total of how many hops?

- A. 5
- B. 10
- C. 24
- D. 54

134. Water causes more attenuation particularly on what frequency?

- A. 20 GHz
- B. 63 GHz
- C. 183 GHz
- D. 202 GHz

135. At what frequency does oxygen cause excessive attenuation?

- A. 60 GHz
- B. 50 GHz
- C. 40 GHz
- D. 30 GHz

136. Which of the following is an atmospheric attenuation?

- A. Attenuation due to water vapor and oxygen
- B. Attenuation due to mist and fog
- C. Attenuation due to other gases
- D. Attenuation due to rain.

137. A microwave system operating at the 6 GHz band is carrying 600 voice channels. What is the noise loading power in dBmO?

- A. 12.78
- B. 26.78
- C. 27.78
- D. 10.25

138. _____ is a microwave link between the down-town terminal and another out of town terminal.

- A. STL
- B. Uplink
- C. Downlink
- D. Terrestrial

139. Attenuator is used in the traveling wave tube to

- A. Prevent oscillation
- B. Increase gain
- C. Prevent saturation
- D. All of these

140. Is a method of diversity reception applied to reflective path to reduce fading.

- A. Frequency diversity
- B. Space diversity
- C. Polarization diversity
- D. Wavelength diversity

141. What is the effective earth's radius used in communications design?

- A. 4000 miles
- B. $K \times 4000$ miles
- C. 5000 miles
- D. $K \times 5280$ miles

142. IF bandwidth of a radar system is inversely proportional to

- A. Pulse width
- B. Pulse interval
- C. Peak transmit power
- D. All of these

143. EADI stands for

- A. Electronic Air Data Indicator
- B. Electronic Altitude and Distance Indicator
- C. Electronic Altitude and Director Indicator
- D. Electronic Air and Distance Indicator

144. Which aircraft navigational system determines the time to station (TTS) or time to go (TTG)?

- A. ADF
- B. DME
- C. Timer
- D. ATC

145. What frequency does a radio altimeter operate?

- A. 33500 kHz
- B. 43000 kHz
- C. 33500 MHz
- D. 43500 MHz

146. What inflight system allows passengers to make telephone calls, send faxes, and computer data shop and play computer games, etc.?

- A. Inflight Satellite System
- B. Terrestrial Flight Telephone System
- C. World Airline Entertainment System
- D. Satellite Phone

147. ADF stands for

- A. Audio Direction Findings
- B. Automatic Direction Finder
- C. Alternate Direction Finder
- D. Automatic Distance Finder

148. RF carrier of the middle marker is modulated at ____ Hz.

- A. 1300
- B. 1400
- C. 1500
- D. 1600

149. Which of the following is considered as the major advantage of using a helix traveling wave tube?

- A. Cheaper
- B. Less noise
- C. High power
- D. Wide bandwidth

150. RADAR stands for

- A. Radio Distance and Ranging
- B. Radio Detection and Ranging
- C. Radio Direction and Ranging
- D. Radio Distance and Range

151. Attenuator is used in the travelling wave tube to

- a. Help bunching
- b. Prevent oscillations
- c. Prevent saturation
- d. Increase gain

152. The multicavity klystron

- a. Is not a good low-level amplifier because of noise
- b. Has a high repeller voltage to ensure a rapid transmit time
- c. Is not suitable for pulsed operation
- d. Needs a long transit time through the buncher cavity to ensure current modulation

153. What is the effective radiated power of a repeater with 450 W transmitting power output, 4 dB feedline loss, 6dB duplexer loss, and 7 dB circulator and feedline loss and antenna gain of 25 dB?

- a. 2893.31 W
- b. 2523.83 W
- c. 2839.31 W
- d. 2425.38 W

154. Magnetron oscillator are used for

- a. Generating SHF signals
- b. Multiplexing
- c. Generating rich harmonics
- d. FM demodulation

155. A microwave tube which has the advantage of having a high efficiency

- a. Cross-field amplifier
- b. Helix traveling wave tube
- c. Klystron
- d. Gridded tube

156. What term is used to describe the variation in a microwave oscillator frequency caused by power supply voltage or current changes?

- a. Frequency pulling
- b. Frequency pushing

- c. Post-tuning drift
- d. Tuning sensitivity

157. A rectangular waveguide has a width of 1.2 in and a height of 0.7 in. the waveguide will pass all signals above __ GHz.

- a. 4 GHz
- b. 8.44 GHz
- c. 10 GHz
- d. 4.92 GHz

158. Waveguides are

- a. A hollow tube that carries HF
- b. Solid conductors of RF
- c. Coaxial cables
- d. Copper wire

159. A TWT is sometimes preferred to the multi-cavity klystron amplifier because the former

- a. Is more efficient
- b. Has a greater bandwidth
- c. Has a higher number of modes
- d. Produces a higher output power

160. Variation in oscillator frequency with changes in load SWR

- a. Frequency pulling
- b. Frequency pushing
- c. Post-tuning drift
- d. Tuning sensitivity

161. It is the frequency change of an electronically tuned oscillator at a specified time after it has reached its desired frequency

- a. Frequency pulling
- b. Frequency pushing
- c. Post-tuning drift
- d. Tuning sensitivity

162. What is the power level of the smallest signal that can be detected above the noise by a Schottky diode?

- a. -20 dBm
- b. 0 dBm
- c. -60 dBm
- d. -100 dBm

163. A line-of-sight radio link operating at a frequency of 6GHz has a separation of 50 km between antennas. An obstacle in the path is located 10 km from the transmitting antenna. By how much must the beam clear the obstacle?

- a. 11.6 m
- b. 13.4 m
- c. 19.34 m
- d. 22.33 m

164. AM isolator

- a. Acts a buffer between microwave oscillators coupled to a waveguide
- b. Acts as a buffer to protect a microwave oscillator from variations in the load changes
- c. Shields UHF circuits from RF transmitter
- d. Both a and b

165. What is the effective earth's radius when $N_s = 300$?

- a. 8500 km
- b. 9320 km

- c. 5600 km
- d. 4850 km

166. What is the power level of the largest signal that will still be in the square-law range of a Schottky diode?

- a. -20 dBm
- b. 0 dBm
- c. -60 dBm
- d. -100 dBm

167. A component that combines microwave signals from separate transmission lines into one common transmission line and allows no coupling between the separate lines

- a. Isolator
- b. Circulator
- c. Directional coupler
- d. Combiner

168. Telemetry is a microwave communications system which operates at

- a. 600 MHz
- b. 3.9 GHz
- c. 4 GHz
- d. 2 GHz

169. What is the maximum power that can be obtained from a microwave semiconductor?

- a. 1 W
- b. 500 mW
- c. 10 W
- d. 4 W

170. The cavity magnetron uses strapping to

- a. Prevent mode-jumping
- b. Prevent cathode back-heating
- c. Ensure bunching
- d. Improve the phase-focusing effect

171. As a result of reflections from a plane conducting wall, electromagnetic waves acquire an apparent velocity greater than the velocity of light in space. This is called the

- a. Velocity of propagation
- b. Normal velocity
- c. Group velocity
- d. Phase velocity

172. Which of the following is a method of modulating digital signals onto a microwave carrier?

- a. FSK
- b. Biphase
- c. Quadrature phase
- d. All of the above

173. Suppose that the transmitter and receiver towers have equal height. How high would they have to be to communicate over a distance of 34 km?

- a. 23.5 m
- b. 28.47 m
- c. 17 m
- d. 8.47 m

174. In microwave communications system, for a carrier frequency of 6 GHz

and a distance of 40 km, determine the free-space path loss in dB.

- a. 80 dB
- b. 84.2 dB
- c. 140 dB
- d. 144.2 dB

175. A microwave relay repeater that receives the modulated microwave carrier and obtains the baseband signal from it, and then modulates the baseband signal onto another carrier and retransmits the new carrier with the baseband modulated onto it

- a. Heterodyne repeater
- b. Baseband repeater
- c. RF repeater
- d. Regenerative repeater

176. Which is the frequency range of the most common industrial microwave relay band?

- a. 6.575-6.875 GHz
- b. 3.7-4.2 GHz
- c. 5.925-6.425 GHz
- d. 10.7-11.7 GHz

177. When a particular mode is excited in a waveguide, there appears an extra electric component, in the direction of propagation. The resulting mode is

- a. Transverse-electric
- b. Transverse-magnetic
- c. Longitudinal
- d. Transverse-electromagnetic

178. Waveguide construction

- a. Should not use silver plating
- b. Should not use copper
- c. Should not have short vertical runs
- d. Should not have long horizontal runs

179. In a microwave system, the antenna sees a sky temperature of 120 K, and the antenna feedline has a loss of 3 dB. Calculate the noise temperature of the antenna/feedline system, referenced to the receiver input.

- a. 205 K
- b. 233.33 K
- c. 182 K
- d. 210 K

180. A choke flange may be used to couple two waveguides

- a. To help in the alignment of the waveguides
- b. Because it is simpler than any other join
- c. To compensate for discontinuities at the join
- d. To increase the bandwidth of the system

181. A PIN diode is

- a. A metal semiconductor point-contact diode
- b. A microwave mixer diode
- c. Often used a microwave detector
- d. Suitable for use as a microwave switch

182. For some applications, circular waveguides may be used preferred to rectangular ones because

- a. The smaller cross section needed at any frequency
- b. Lower attenuation
- c. Freedom from spurious modes
- d. Rotation of polarization

183. A circulator

- a. Cools dc motors during heavy loads
- b. Allows two or more antennas to feed one transmitter
- c. Allows one antenna to feed two separate microwave transmitters and receivers at the same time
- d. Insulates UHF frequencies on transmission lines

184. What is the free-space loss in dB between two microwave parabolic antennas 38 km apart operating at 7 GHz?

- a. 85.10 dB
- b. 80.90 dB
- c. 140.90 dB
- d. 145.10 dB

185. A ruby maser amplifier must be cooled

- a. Because the maser amplification generates a lot of heat
- b. To increase bandwidth
- c. Because it cannot operate at room temperature
- d. To improve the noise performance

186. The glass tube of a TWT may be coated with aquadag to

- a. Help focusing
- b. Provide attenuation
- c. Improve bunching
- d. Increase gain

187. An antenna covering that the transmitted or receives microwave power can pass through, used to protect the antenna and the antenna feed from weather

- a. Shroud
- b. Sub-reflector
- c. Radome
- d. Offset antenna

188. Waveguide are

- a. Used exclusively in high frequency power supplies
- b. Ceramic couplers attached to the antenna terminals
- c. High-pass filters used at low radio frequencies
- d. Hollow metal conductors used to carry high-frequency current

189. A microwave device which is unlikely to be used a pulsed device. It is based on the principle of operation of a traveling wave tube.

- a. Multicavity klystron
- b. Cross-field amplifier (CFA)
- c. Backward wave oscillator (BWO)
- d. Coaxial magnetron

190. A magnetic field is used in the cavity magnetron to

- a. Prevent anode current in the absence of oscillations
- b. Ensure that the oscillations are pulsed
- c. Help in focusing the electron beam thus preventing spreading
- d. Ensure that the electrons will orbit around the cathode

191. In a micro wave communications system, if the minimum carrier-to-noise (C/N) requirements for a receiver with a 10MHz bandwidth is 22 dB, the minimum receive carrier power is...

- a. -82 dB
- b. 76 dBm
- c. 84 dB
- d. -82 dBm

192. A rectangular waveguide used for microwave transmission has a width of 1.4 inches and a height of 0.8 inches. All signals above __ GHz will be passed by the waveguide.

- a. 4.3 GHz
- b. 2 GHz
- c. 4.2 GHz
- d. 5 GHz

193. A pyramidal horn has an aperture (opening) of 58 mm in the E plane and 78 mm in the H plane. It operates at 14 GHz. Calculate the gain in dBi.

- a. 19.29
- b. 24.14
- c. 15.8
- d. 19.31

194. A magnetron whose oscillating frequency is electronically adjustable over a wide range is called a

- a. Coaxial magnetron
- b. Dither-tuned magnetron
- c. Frequency agile magnetron
- d. VTM

195. Conductance takes place in a waveguide

- a. By inter-electron delay
- b. Through electrostatic field reluctance
- c. In the same manner as a transmission line
- d. Through electromagnetic and electrostatic fields in the walls of the waveguide

196. Indicate the false statement. Klystron amplifiers may use intermediate cavities to

- a. Prevent the oscillations that occurs in two-cavity klystrons
- b. Increase the bandwidth of the device
- c. Improve power gain
- d. Increase the efficiency of the klystron

197. The primary purpose of the helix in a traveling wave tube is to

- a. Prevent the electron beam from spreading in the long tube
- b. Reduce the axial velocity of the RF field
- c. Ensure broadband operation
- d. Reduce the noise figure

198. A microwave device which allows RF energy to pass through in one direction with very little loss, but absorbs RF power in the opposite direction

- a. Circulator
- b. Wave trap
- c. Multiplexer
- d. Isolator

199. A parametric amplifier must be cooled

- a. Because parametric amplification generates a lot of heat
- b. To increase bandwidth
- c. Because it cannot operate at room temperature
- d. To improve the noise performance

200. For low attenuation, the best transmission medium is

- a. Flexible waveguide
- b. Ridged waveguide
- c. Rectangular waveguide
- d. Coaxial line

201. IF repeaters are also called

- a) heterodyne receiver
- b) mixer/receiver
- c) radio receiver
- d) FM receiver

202. It is the difference between the nominal output power of a transmitter and the minimum input power required by a receiver

- a) RSL
- b) IRL
- c) system gain
- d) FSL

203. A phenomenon whereby the frequency of a reflected of a reflected signal is shifted if there is relative motion between the source and reflecting object.

- a) Doppler effect
- b) Hall effect
- c) Marconi effect
- d) Maxwell effect

204. A ferrite is

- a) a nonconductor with magnetic properties
- b) an intermetallic compound with particularly good conductivity
- c) an insulator which heavily attenuates magnetic fields
- d) a microwave semiconductor invented by Faraday

205. The primary purpose of the helix in a traveling-wave tube is to

- a) prevent the electron beam from spreading in the long tube
- b) reduce the axial velocity of the RF field
- c) ensure the broadband operation
- d) reduce the noise figure

206. The attenuator is used in the travelling-wave tube to

- a) help bunching
- b) prevent oscillations

- c) prevent saturation
- d) increase the gain

207. A magnetron is used only as

- a) amplifier
- b) oscillator
- c) mixer
- d) frequency multiplier

208. A backward-wave oscillator is based on the

- a) rising-sun magnetron
- b) crossed-field amplifier
- c) coaxial magnetron
- d) traveling-wave tube

209. Stripline and microstrip transmission lines are usually made with

- a) coax
- b) parallel lines
- c) twisted pair
- d) PCBs

210. Which of the following is not a microwave tube?

- a) Traveling-wave tube
- b) Cathode-ray tube
- c) Klystron
- d) Magnetron

211. Indicate which is not true. Compared with other types of radar, phased array radar has the following advantages

- a) very fast scanning

- b) ability to track and scan simultaneously
- c) circuit simplicity
- d) ability to track many targets simultaneously

212. Given the frequency and dimensions of 5 GHz and 7 cm by 9 cm respectively, the beam of the pyramidal horn is about _____.

- a) 27 degrees
- b) 53 degrees
- c) 60 degrees
- d) 80 degrees

213. The diameter of a parabolic reflector should be at least how many wavelengths at the operating frequency?

- a) 1
- b) 2
- c) 5
- d) 10

214. A type of microwave repeater where the received RF carrier is down-converted to an IF frequency, amplified filtered and further demodulated to baseband.

- a) RF repeater
- b) IF repeater
- c) baseband repeater
- d) radio repeater

215. In order to reduce cross-sectional dimensions, the waveguide to use is

- a) circular
- b) ridged
- c) rectangular
- d) flexible

216. Indicate which one of the following applications or advantages of radar beacons is false:

- a) target identification
- b) navigation
- c) very significant extension of the maximum range
- d) more accurate tracking enemy targets

217. Refers to more than one transmission path or method of transmission available between transmitter and a receiver.

- a) diversity
- b) polarization
- c) efficiency
- d) accuracy

218. A solution to the “blind speed” problem is to

- a) change the Doppler frequency
- b) vary the RF
- c) use monopulse
- d) use MTI

219. A direct path that exist between the transmit and receive antennas

- a) LOS
- b) direct waves
- c) space waves
- d) terrestrial waves

220. The function of the quartz delay line in an MTI radar is to

- a) help in subtracting a complete scan from the previous scan

- b) match the phase of the coho and the stalo
- c) match the phase of the coho and the output oscillator
- d) delay a sweep so that the next sweep can be subtracted from it

221. Type of diversity where it modulates two different RF carrier frequencies with the same IF intelligence, then transmitting both RF signals to a given destination.

- a) polarization diversity
- b) quad diversity
- c) space diversity
- d) frequency diversity

222. The coho in MTI radar operates at the

- a) intermediate frequency
- b) transmitted frequency
- c) received-frequency
- d) pulse operation frequency

223. Which type of diode does not ordinarily operate with reverse bias?

- a) Varactor
- b) IMPATT
- c) Snapp-off
- d) Tunnel

224. What happens when a horn antenna is made longer?

- a) gain increases
- b) beam width decreases
- c) bandwidth increases
- d) bandwidth decreases

225. A pyramidal horn used at 5 GHz has an aperture that is 7 cm by 9 cm. The gain is about

- a) 10.5 dB
- b) 11.1 dB
- c) 22.6 dB
- d) 35.8 dB

226. Type of diversity where the output of the transmitter is fed to two or more antennas that are physically separated by an appreciable wavelengths

- a) quad diversity
- b) wavelength diversity
- c) space diversity
- d) hybrid diversity

227. The Doppler effect is used in (indicate the false statement)

- a) moving-target plotting on the PPI
- b) the MTI system
- c) FM radar
- d) CW radar

228. A type of diversity where a single RF carrier is propagated with two different electromagnetic polarization.

- a) space diversity
- b) wavelength diversity
- c) polarization diversity
- d) hybrid diversity

229. The A scope displays

- a) the target position and range
- b) the target range, but not position

- c) the target position, but not range
- d) neither range nor position, but only velocity

230. The glass tube of a TWT may be coated with aquadag to

- a) help focusing
- b) provide attenuation
- c) improve bunching
- d) increase gain

231. Type of diversity which consists of a standard frequency diversity path where the two transmitter/receiver pair at one end of the path are separated from each other and connected to different antennas that are vertically separated as in space diversity

- a) quad diversity
- b) wavelength diversity
- c) space diversity
- d) hybrid diversity

232. The biggest disadvantage of CW Doppler radar is that

- a) it does not give the target velocity
- b) it does not give the target range
- c) a transponder is required at the target
- d) it does not give the target position

233. The combination of the frequency, space, polarization and receiver diversity into one system

- a) hybrid diversity

- b) quad diversity
- c) space diversity
- d) wavelength diversity

234. If the target cross section is changing, the best system for accurate tracking in

- a) lobe switching
- b) sequential lobing
- c) conical switching
- d) monopulse

235. The multicavity klystron

- a) is not good low-level amplifier because of noise
- b) has a high repeller voltage to ensure a rapid transmit time
- c) is not suitable for pulse operation
- d) needs a long transmit time through the buncher cavity to ensure current modulation

236. An arrangement that avoids a service interruption during periods of deep fades or equipment failures.

- a) service switching arrangement
- b) protection switching arrangement
- c) interruption switching arrangement
- d) equipment switching arrangement

237. A type of attenuator where attenuation is accomplished by insertion of a thin card of resistive material through a slot in the top of a waveguide

- a) flap attenuator

- b) vane attenuator
- c) slot attenuator
- d) directional coupler

238. After a target has been acquired, the best scanning system for tracking is

- a) nodding
- b) spiral
- c) conical
- d) helical

239. A duplexer is used

- a) to couple two different antennas to a transmitter without mutual interference
- b) to allow the one antenna to be used for reception or transmission without mutual interference
- c) to prevent interference between two antennas when they are connected to a receiver
- d) to increase the speed of pulses in pulsed radar

240. Type of protection switching arrangement where each working radio channel has a dedicated backup or spare channel

- a) hot swap
- b) hot backup
- c) hot standby
- d) hot diversity

241. If a return echo arrives after the allocated pulse interval,

- a) it will interfere with the operation of the transmitter

- b) the receiver might be overloaded
- c) it will not be received
- d) the target will appear closer than it really is

242. Points in the microwave system baseband signals either originate or terminate

- a) terminator
- b) terminal stations
- c) terminating equipment
- d) terminal equipment

243. A half wavelength, closed section of a waveguide that acts as a parallel resonant circuit is known as ____.

- a) half-wave section
- b) cavity resonator
- c) LCR circuit
- d) directional couple

244. Decreasing the volume of a cavity causes its resonant frequency to

- a) increase
- b) decrease
- c) remains the same
- d) drop to zero

245. The IF bandwidth of a radar receiver is inversely proportional to the

- a) pulse width
- b) pulse repetition frequency
- c) pulse interval
- d) the target will appear closer than it really is

246. Which of the following devices are not being used in microwave power amplifier?

- a) klystron tubes
- b) traveling wave tubes
- c) IMPATT
- d) magnetron

247. Which is not true? A high PRF will

- a) make the returned echoes easier to distinguish from noise
- b) make the target tracking easier with conical scanning
- c) increase the maximum range
- d) have no effect on the range resolution

248. It is a unidirectional device often made up of ferrite material used in conjunction with a channel-combining network to prevent the output from interfering with the output of another transmitter

- a) circulator
- b) magic tee
- c) isolator
- d) rat race

249. Which is not true about the following: Flat-topped rectangular pulses must be transmitted in radar to

- a) allow a good minimum range
- b) make the returned echoes easier to distinguish from the noise
- c) prevent frequency changes in the magnetron
- d) allow accurate range measurements

250. The power that leaks out of the back and sides of the transmit antenna interfering with the signal entering with the signal entering the input of a nearby receive antenna.

- a) ringaround
- b) ringabout
- c) roundabout
- d) turnaround

251. Which of the following is not true: The radar cross section of a target

- a) depends on the frequency used
- b) may be reduced by special coating of the target
- c) depends on the aspect of a target, if this non-spherical
- d) is equal to the actual cross-sectional area for small targets

252. It is a general term applied to the reduction in signal strength at the input to a receiver

- a) fading
- b) attenuation
- c) absorption
- d) ghosting

253. Indicate which of the following cannot be followed by the word "waveguide"

- a) elliptical
- b) flexible
- c) coaxial
- d) ridged

254. If the ratio of the antenna diameter to the wavelength in a radar system is

high, this will result in (indicate the false statement)

- a) large maximum range
- b) good target discrimination
- c) difficult target acquisition
- d) increased capture area

255. High-power TWTs are replacing what in microwave amplifiers?

- a) MESFETs
- b) Magnetrons
- c) Klystrons
- d) IMPATT diodes

256. The most widely used microwave antenna is a

- a) half-wave dipole
- b) quarter-wave probe
- c) single loop
- d) horn

257. Applies to propagation variables in the physical radio path which affect changes in path loss between the transmitter at one station and its normal receiver at the other station.

- a) ghosting
- b) absorption
- c) attenuation
- d) fading

258. If the antenna diameter in a radar system is increased by a factor of 4, the maximum range will be increased by a factor of

- a) square root of 2

- b) 2
- c) 4
- d) 8

259. If the peak transmitted power in a radar system is increased by a factor of 15, the maximum range will be increased by a factor of

- a) 2
- b) 4
- c) 8
- d) 16

260. Varactor and step-recovery diodes are widely used in what type of circuit?

- a) amplifier
- b) oscillator
- c) frequency multiplier
- d) mixer

261. It is defined as line loss incurred by an electromagnetic wave as it propagates in a straight line through a vacuum with no absorption or reflection of energy from nearby objects.

- a) IRL
- b) FSL
- c) RSL
- d) Eb/No

262. For proper operation, a magnetron must be accompanied by a

- a) cavity resonator
- b) strong electric field
- c) permanent magnet
- d) high dc voltage

263. A police radar speed trap functions at a frequency of 1.024 GHz in direct line with your car. The reflected energy from your car is shifted 275 Hz in frequency. Calculate the speed in miles per hour?

- a) 60 mph
- b) 70 mph
- c) 80 mph
- d) 90 mph

264. It is the ratio of the wideband carrier to the wideband noise power

- a) carrier to noise ratio
- b) signal to noise ratio
- c) energy per bit per noise density ratio
- d) noise figure

265. What is the duty cycle of a radar pulse if the pulse width is $1\mu\text{s}$, the pulse repetition rate is 900, and the average power is 18 W?

- a) 0.09 %
- b) 0.99 %
- c) 0.90 %
- d) 1.00 %

266. A microwave tube amplifier uses an axial magnetic field and a radial electric field. This is the

- a) reflex klystron
- b) coaxial magnetron
- c) traveling-wave magnetron
- d) CFA

267. Figure of merit used to indicate how much the signal-to-noise ratio

deteriorates as a signal passes through a circuit or series of circuits

- a) noise factor
- b) signal to noise ratio
- c) carrier to noise ratio
- d) dynamic range

268. What is the peak power of a radar pulse if the pulse width is $1\mu\text{s}$, the pulse repetition rate is 900, and the average power is 18 W?

- a) 10 kW
- b) 15 kW
- c) 20 kW
- d) 30 kW

269. The point where the antenna is mounted with respect to the parabolic reflector is called the

- a) focal point
- b) center
- c) locus
- d) tangent

270. The operating frequency of klystron and magnetrons is set by the

- a) cavity resonators
- b) DC supply voltage
- c) input signal frequency
- d) Number of cavities

271. Using a small reflector to beam waves to the larger parabolic reflector is known as

- a) focal feed
- b) horn feed
- c) cassegrain feed

- d) coax feed

272. If the noise figures and gains of each of the amplifiers in cascade is 3 dB and 10 dB respectively. What is the total noise figure?

- a) 2.12 dB
- b) 3.24 dB
- c) 1.24 dB
- d) 4.23 dB

273. One of the following is unlikely to be used as a pulsed device

- a) multicavity klystron
- b) BWO
- c) CFA
- d) TWT

274. Calculate the maximum ambiguous range for a radar system with PRT equal to $400\mu\text{s}$.

- a) 13.8 mi
- b) 43.5 mi
- c) 16.4 mi
- d) 32.8 mi

275. When electromagnetic waves are propagated in a waveguide

- a) they travel along the broader walls of the guide
- b) they are reflected from the walls but do not travel along them
- c) they travel through the dielectric without the walls
- d) they travel along all four walls of the waveguide

276. What is the distance in nautical miles to a target if it takes $123\mu\text{s}$ for a radar pulse to travel from the radar antenna to the target, back to the antenna, and be displayed on the PPI scope?

- a) 10 nmi
- b) 5 nmi
- c) 20 nmi
- d) 15 nmi

277. Waveguides are used mainly for microwave signals because

- a) they depend on straight-line propagation which applies to microwaves only
- b) losses would be too heavy at lower frequencies
- c) there are no generators powerful enough to excite them at lower frequencies
- d) they would be too bulky at lower frequencies

278. Calculate the coupling of a directional coupler that has 70 mW into the main guide and 0.35 mW out the secondary guide.

- a) 13 dB
- b) 23 dB
- c) 33 dB
- d) 10 dB

279. The wavelength of a wave in a waveguide

- a) is greater than in free space
- b) depends only on the waveguide dimensions and the free space wavelength

- c) is inversely proportional to the phase velocity
- d) is directly proportional to the group velocity

280. A rectangular waveguide is 1 cm by 2 cm. Calculate the cutoff frequency

- a) 3.5 GHz
- b) 15 GHz
- c) 7.5 GHz
- d) 4 GHz

281. The main difference between the operation of transmission liners and waveguides is that

- a) the latter is not distributed, like transmission lines
- b) the former can use stubs and quarter-wave transformers, unlike the latter
- c) transmission lines use the principal mode of propagation, and therefore do not suffer from low-frequency cut-off
- d) terms such as impedance matching and standing-wave ratio cannot be applied to waveguides

282. The useful power of the transmitter that is contained in the radiated pulses is termed as ____.

- a) rms power
- b) rated power
- c) peak power
- d) average power

283. In radars, echoes that are produced when the reflected beam is strong enough to make a second trip

- a) double range echoes
- b) double frequencies echoes
- c) second return echoes
- d) second time around echoes

284. Indicate the false statement. Compared with equivalent transmission lines, 3 GHz waveguides

- a) are less lossy
- b) can carry higher powers
- c) are less bulky
- d) have lower attenuation

285. The range beyond which targets appear as second return echoes is called

- a) maximum range
- b) maximum unambiguous range
- c) maximum usable range
- d) any of these

286. When a particular mode is excited in a waveguide, there appears an extra electric component, in the direction of propagation. The resulting mode is

- a) transverse electric
- b) transverse magnetic
- c) longitudinal
- d) transverse-electromagnetic

287. In radars, echoes that arrive after the transmission of the next pulse are called ____.

- a) second return echoes
- b) second time around echoes
- c) multiple time around echoes
- d) any of these

288. When electromagnetic waves are reflected at an angle from a wall, their wavelength along the wall is

- a) the same as the free space
- b) the same as the wavelength perpendicular to the wall
- c) shortened because of the Doppler effect
- d) greater than in the actual direction of propagation

289. A radar mile is equivalent to

- a) 2000 mi
- b) 2000 m
- c) 2000 yd
- d) 2000 km

290. As a result of reflections from a plane conducting wall, electromagnetic waves acquire an apparent velocity of light in space

- a) velocity of propagation
- b) normal velocity
- c) group velocity
- d) phase velocity

291. In radars, the time between pulses is called _____.

- a) rest time
- b) duration time
- c) delay time
- d) propagation time

292. Indicate the false statement. When the free-space wavelength of a signal equals the cutoff wavelength of the guide

- a) the group velocity of the signal becomes zero
- b) the phase velocity of the signal becomes infinite
- c) the characteristic impedance of the guide becomes infinite
- d) the wavelength within the waveguide becomes infinite

293. In radars, the duration of the pulse is

- a) duty cycle
- b) pulse width
- c) pulse amplitude
- d) pulse cycle

294. A signal propagated in a waveguide has a full wave electric intensity change between two further walls, and no component of the electric field in the direction of propagation. The mode is

- a) TE₁₁
- b) TE₁₀
- c) TM₂₂
- d) TE₂₀

295. In radars, the number of the pulses transmitted per second is called

- a) pulse repetition frequency
- b) pulse repetition time
- c) pulse repetition phase
- d) pulse number of repetition

296. Which of the following is incorrect? The dominant mode of propagation is preferred with rectangular waveguides because

- a) it leads to the smallest waveguide dimensions
- b) the resulting impedance can be matched directly to coaxial lines
- c) it is easier to excite than other modes
- d) propagation of it without any spurious generation can be ensured

them to each other, which could not be use?

- a) rat-race
- b) E-plane T
- c) hybrid ring
- d) magic T

297. It is a mean of employing radio waves to detect and locate objects such as aircraft, ships and land masses.

- a) detectors
- b) radars
- c) repeaters
- d) beacons

298. A choke flange may be used to couple two waveguides

- a) to help the alignment of the waveguides
- b) because it is simpler than any other join
- c) to compensate for discontinuities at the join
- d) to increase the bandwidth of the system

299. The resonant frequency of a cavity may be varied by changing any of these parameters except:

- a) cavity volume
- b) cavity inductance
- c) cavity capacitance
- d) cavity resistance

300. In order to couple two generators to a waveguide system without coupling

Answers

1. Attenuation
2. 8493 km
3. towards the earth
4. $S = 3\lambda R/L$
5. 10 GHz
6. Sixth
7. Slow fading
8. Slow fading
9. Large reflector
10. Delayed spreading
11. SONAR
12. Is equivalent to an LC resonant circuit
13. ± 2000 Hz
14. All of the above
15. magnetron
16. The absorption of energy by the signal from an electron stream
17. To keep the electrons from spreading out
18. Both B and C
19. 1 to 100 GHz
20. Degree of emission from the cathode
21. Velocity modulation at the input cavity creates density modulation at the output cavity
22. The dimension of each cavity resonator
23. π mode
24. Depends on the formation of charge domain
25. Circulator
26. A narrow, antenna-beam width in the horizontal plane
27. Which may be used to tune the radar receiver
28. A silicon crystal
29. 3000 to 30000 MHz
30. By bunches of electrons passing the cavity grids
31. Ferrite emitter
32. Local oscillator
33. All of these
34. Indicates both the range and azimuth of a target
35. Its physical dimensions
36. The interval between transmitted pulses
37. The frequency will decrease
38. Adjusting the flexible wall of the resonant cavity

39. Reduce interference from the effects of sea return
40. Allow the transmitter and the receiver to operate from a common antenna
41. 100 watts
42. As a second anode and to prevent the build-up of secondary field
43. May be decreased
44. Its resonant cavity
45. No noticeable effect
46. Isolator
47. All of these
48. The shortest possible time
49. Magnetron
50. Loran C: 100 kHz
51. Circulator
52. Duty cycle/pulse width
53. Produce a trigger pulse for the transmitter
54. Pulse frequency and antenna rotation rate
55. circulator
56. 156.76 MHz and 156.8 MHz
57. Frequencies of the duty cycle
58. Can reduce sea-return response
59. Isolator
60. Target's range and bearing
61. Radio frequency
62. Maintain the desired klystron frequency
63. Cathode end of the helix
64. Both lower antenna rotation speeds and higher pulse repetition
65. LF band
66. To act as the second anode
67. 8000 MHz
68. More spectrum space for signals
69. NTC
70. Higher-cost equipment
71. 22 GHz
72. Mobile radio
73. High loss
74. PCBs
75. Rectangle
76. 5.9 GHz
77. 15 GHz
78. Electric and magnetic fields
79. Transverse electric
80. TE_{1,0}
81. Probe

- | | |
|--------------------------|---|
| 82. Cavity resonator | 105. Infinity |
| 83. Decrease | 106. 9.7 nmi |
| 84. Hot carrier | 107. Antenna directivity |
| 85. Frequency multiplier | 108. 0.013 % |
| 86. Gunn | 109. Speed |
| 87. Tunnel | 110. Frequency |
| 88. Reflex klystrons | 111. Magnetron |
| 89. Cathode-ray tube | 112. Gunn diode |
| 90. Catcher cavity | 113. Spark gap |
| 91. Oscillator | 114. Horn and parabolic reflector |
| 92. Permanent magnet | 115. PPI |
| 93. Cavity resonators | 116. Phased array |
| 94. Oscillator | 117. 10 GHz |
| 95. Radar | 118. The distances involve are grater |
| 96. Helix | 119. Waveguides |
| 97. Wider bandwidth | 120. K-band |
| 98. Klystrons | 121. $92.4 + 20 \log f + 20 \log d$ |
| 99. Horn | 122. High pass filter |
| 100. MTBF | 123. Frequency diversity |
| 101. 142.55 dB | 124. Litz wire |
| 102. Baseband repeater | 125. Antennas operating on the same frequencies |
| 103. More | 126. Frequency diversity |
| 104. 0.6 | |

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|--|---|
| 127. Flattening | 148. 1300 |
| 128. Electron gun, helix and collector | 149. 6 AND gates and one 4-bit binary adder |
| 129. Shorten waveguide length | 150. Radio Detection and Ranging |
| 130. The lowest frequency the waveguide operates | 151. Prevent oscillations |
| 131. Decreased | 152. Is not a good low-level amplifier because of noise |
| 132. Greater than in free space | 153. 2839.31 W |
| 133. 54 | 154. Generating SHF signals |
| 134. 183 GHz | 155. Cross-field amplifier |
| 135. 60 GHz | 156. Frequency pushing |
| 136. Attenuation due to water vapor and oxygen | 157. 4.92 GHz |
| 137. 12.78 | 158. A hollow tube that carries HF |
| 138. Terrestrial | 159. Has a greater bandwidth |
| 139. Prevent oscillation | 160. Frequency pulling |
| 140. Space diversity | 161. Post-tuning drift |
| 141. K x 4000 miles | 162. -60 dBm |
| 142. Pulse width | 163. 11.6 m |
| 143. Electronic Altitude and Director Indicator | 164. Both a and b |
| 144. DME | 165. 8500 km |
| 145. 43500 MHz | 166. -20 dBm |
| 146. Terrestrial Flight Telephone System | 167. Combiner |
| 147. Automatic Direction Finder | 168. 2 GHz |
| | 169. 10 W |

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| 170. Prevent mode-jumping | 190. Ensure that the electors will orbit around the cathode |
| 171. Phase velocity | 191. -82 dBm |
| 172. All of the above | 192. 4.3 GHz |
| 173. 17 m | 193. 19.29 |
| 174. 140 dB | 194. VTM |
| 175. Baseband repeater | 195. Through electromagnetic and electrostatic fields in the walls of the waveguide |
| 176. 6.575 - 6.875 GHz | 196. Prevent the oscillations that occurs in two-cavity klystrons |
| 177. Transverse-magnetic | 197. Reduce the axial velocity of the RF field |
| 178. Should not have long horizontal runs | 198. Isolator |
| 179. 205 K | 199. To improve the noise performance |
| 180. To compensate for discontinuities at the join | 200. Rectangular waveguide |
| 181. Suitable for use as a microwave switch | 201. heterodyne receiver |
| 182. Lower attenuation | 202. system gain |
| 183. Allows one antenna to feed two separate microwave transmitters and receivers at the same time | 203. Doppler effect |
| 184. 140.90 dB | 204. a nonconductor with magnetic properties |
| 185. Because it cannot operate at room temperature | 205. reduce the axial velocity of the RF field |
| 186. Provide attenuation | 206. prevent oscillations |
| 187. Radome | 207. oscillator |
| 188. Hollow metal conductors used to carry high-frequency current | 208. traveling-wave tube |
| 189. Backward wave oscillator (BWO) | |

- 209. PCBs
- 210. Cathode-ray tube
- 211. circuit simplicity
- 212. 53 degrees
- 213. 10
- 214. baseband repeater
- 215. ridged
- 216. more accurate tracking enemy targets
- 217. diversity
- 218. vary the RF
- 219. LOS
- 220. help in subtracting a complete scan from the previous scan
- 221. frequency diversity
- 222. intermediate frequency
- 223. Tunnel
- 224. gain increases
- 225. 10.5 dB
- 226. space diversity
- 227. moving-target plotting on the PPI
- 228. polarization diversity
- 229. the target range, but not position
- 230. provide attenuation
- 231. hybrid diversity
- 232. it does not give the target range
- 233. quad diversity
- 234. monopulse
- 235. is not good low-level amplifier because of noise
- 236. protection switching arrangement
- 237. flap attenuator
- 238. conical
- 239. to allow the one antenna to be used for reception or transmission without mutual interference
- 240. hot standby
- 241. the target will appear closer than it really is
- 242. terminal stations
- 243. cavity resonator
- 244. increase
- 245. pulse width
- 246. magnetron
- 247. increase the maximum range
- 248. isolator
- 249. make the returned echoes easier to distinguish from the noise

- | | |
|--|---|
| 250. ringaround | 272. 3.24 dB |
| 251. is equal to the actual cross-sectional area for small targets | 273. BWO |
| 252. fading | 274. 32.8 mi |
| 253. coaxial | 275. they are reflected from the walls but do not travel along them |
| 254. increased capture area | 276. 10 nmi |
| 255. Klystrons | 277. they would be too bulky at lower frequencies |
| 256. horn | 278. 23 dB |
| 257. fading | 279. is greater than in free space |
| 258. 4 | 280. 7.5 GHz |
| 259. 2 | 281. transmission lines use the principal mode of propagation, and therefore do not suffer from low-frequency cut-off |
| 260. frequency multiplier | 282. peak power |
| 261. FSL | 283. double range echoes |
| 262. permanent magnet | 284. are less bulky |
| 263. 90 mph | 285. any of these |
| 264. carrier to noise ratio | 286. transverse magnetic |
| 265. 0.09 % | 287. any of these |
| 266. CFA | 288. greater than in the actual direction of propagation |
| 267. noise factor | 289. 2000 yd |
| 268. 20 kW | 290. phase velocity |
| 269. focal point | 291. rest time |
| 270. cavity resonators | |
| 271. cassegrain feed | |

292. the wavelength within the waveguide becomes infinite

293. pulse width

294. TE₂₀

295. pulse repetition frequency

296. the resulting impedance can be matched directly to coaxial lines

297. radars

298. to compensate for discontinuities at the join

299. cavity resistance

300. E-plane T