MOCKBOARD EXAMINATION IN COMMUNICATIONS ENGINEERING

(APRIL 25, 2009)

1. Extra-terrestrial noise is observable at frequencies from
   a. 0 to 20 kHz
   b. above 2 GHz
   c. 8.1.43 GHz
   d. 5 to 8 GHz
2. Band of light waves, that are too short to be seen by human eye.
   a. Visible
   b. Infrared
   c. Ultraviolet
   d. Amber
3. Two wires that are bent 90 degrees apart.
   a. Hertz
   b. Dipole
   c. Log- periodic
   d. Rhombic
4. The first symbol in the designation of radio emission under the ITU rules refer to
   a. nature of signal (s) modulating the main carrier
   b. type of information to be transmitted
   c. bandwidth
   d. Simplex operation
5. Operating method in which the transmission is made alternately in each direction of a telecommunication channel.
   a. Semi duplex operation
   b. Duplex operation
   c. Half-duplex operation
   d. Simplex operation
6. Production of radiation by a radio transmitting station.
   a. Monitoring
   b. Emission
   c. Radiation
   d. Transmission
7. The third symbol in the designation of radio emission under the ITU rules refers to
   a. type of modulation of the main carrier
   b. bandwidth
   c. nature of signal(s) modulating the main carrier
   d. type of information to be transmitted
8. A form of telecommunication for the transmission of transient images of fixed or moving objects.
   a. E- mail
   b. Television
   c. radio
   d. Internet
9. Radiation pattern of a Discone.
   a. Unidirectional
   b. Bidirectional
   c. Omnidirectional
   d. Figure of eight
10. Another SEG function that allows a person to be superimposed on another scene.
   a. Visual effect
   b. Wiper
   c. Chroma keying
   d. Special effect generation
11. What signal- to- noise ratio is required for satisfactory telephone services?
   a. 50 dB
   b. 30 dB
   c. 40 dB
   d. 20 dB
12. The use of telecommunication for automatic indicating or recording measurement at the distance from the measuring instrument.
   a. Monitoring
   b. Tracking
   c. Telemetry
   d. Telecommand
13. The standard deviation of the variation in the transmission loss of a circuit should not exceed.
   a. 3 dB
   b. 1 dB
   c. 5 dB
   d. 0.5 dB
14. Noise caused by the thermal agitation of electrons in resistance.
   a. All of these
   b. Thermal noise
   c. Johnson's noise
   d. White noise
15. Unity gain antenna.
   a. Isotropic
   b. Rhombic
   c. Half- wave dipole
   d. Dummy
16. The series of periodically recurrent pulses is modulated in amplitude by the corresponding instantaneous samples.
   a. PFM
   b. PWM
   c. PDM
   d. PAM
17. This of transmission permits communication in the frequency range from 30 to 60 MHz and over distances from about 1000 to 2000 km.
   a. Troposcatter
   b. Ionospheric scatter

c. Ducting
d. Microwave

18. A region in front of a paraboloid antenna.
a. Transmission zone
b. All of these
c. Fraunhofer
d. Fresnel

19. Designates the sensation of low or high in the sense of the base and treble.
a. Frequency
b. Intensity
c. Pitch
d. SPL

20. A good example of a pilot tone system used in commercial frequency modulation stations.
a. FDM
b. Time division
c. Stereo multiplexing
d. Frequency modulation

21. Emission on a frequency or frequencies immediately outside the necessary bandwidth which result from the modulation process except spurious emission.
a. Radiation
b. Noise
c. Out of the band
d. Interference

22. A helical antenna is used for satellite tracking because of _____.
a. broad bandwidth
b. good front-to- back
c. maneuverability
d. circular polarization

23. Background noise is the same as the following except
a. impulse noise
b. white noise
c. thermal noise
d. gaussian noise

24. An electronic equipment used to measure standing wave ratio.
a. Reflectometer
b. Wavemeter
c. Altimeter
d. Multimeter

25. A single sideband emission in which the degree of carrier suppression enables the carrier to be reconstituted and to be used for demodulation.
a. Reduce carrier single sideband emission
b. Half carrier single sideband emission
c. Full carrier single sideband emission
d. Standard single sideband emission

26. Station in the mobile service not intended to be used while in motion.
a. Coast station
b. Fixed station
c. Base station
d. Land station

27. The electric field in a plane perpendicular to the earth's surface.
a. Elliptical polarization
b. Circular polarization
c. Horizontal polarization
d. Vertical polarization

28. Known to be the first satellite capable to receive and transmit simultaneously.
a. Score
b. Syncom 1
c. Telstar 1
d. Echo 1

29. A digital carrier facility used to transmit a DSI-formatted signal at 1.544 Mbps.
a. T2
b. T1
c. T4
d. T3

30. 12 voice channels are sampled at 8000 sampling rate and encoded into 8 bit PCM word. Determine the rate of the data stream.
a. 354 kbps
b. 750 kbps
c. 768 kbps
d. 640 kbps

31. The most common device used as a light detector in fiber optic communication system.
a. LED
b. Darlington phototransistor
c. APDs
d. PIN diode

32. Two resistor, 20 kΩ are at ambient temperature. Calculate for a bandwidth equal to 100 kHz, the thermal noise voltage for the two resistors connected in parallel.
a. 0.4782 uV
b. 4278 uV
c. 4.78 uV
d. 47.8 Uv

33. Calculate the energy of the photon of infrared light energy at 1.55 um
a. 1.28×10^{-19} J
b. 1.6 x1019[19] J
c. 1.22×10^{-16} J
d. 1.9×10^{-14} J

34. If a fiber optic system has a rise time of 38.55 ns, the source rise time is 12 ns and the detector rise

time is 12 ns, what is the cable rise time?

a. 34.61 ns
b. 14.55 ns
c. 52.55 ns
d. 26.25 ns

35. Nominal voice channel

a. 20 to 40 kHz
b. 16 to 16 kHz
c. 3 to 3 kHz
d. 4 kHz

36. Two or more antennas separated by 9 wavelengths are used.

a. Hybrid diversity
b. Space diversity
c. Polarized diversity
d. Frequency diversity

37. nif stands for

a. narrow intermediate frequency
b. noise interference figure
c. noise improvement factor
d. non- intrinsic figure

38. Any small element of space in the path of a wave may be considered as a source of secondary wavelet.

a. De Morgan's Principle
b. Faraday's Law
c. Huygen's Principle
d. Fresnel's Law Principle

39. Modulation in which the modulated wave is always present.

a. Carrier modulation
b. Front-end
c. Continuous modulation
d. Log-periodic modulation

40. Atmospheric noise is less at severe frequencies above

a. Audio level
b. 30 MHz
c. 10 GHz
d. 1GHz

41. At height about 180 km above, the ___ exist only during daylight.

a. F2 layer
b. D layer
c. E layer
d. F1 layer

42. Radiation characteristics of a dipole.

a. Figure of eight
b. Omnidirectional
c. Bidirectional
d. Unidirectional

43. Determine the gain of a 6 ft. parabolic dish operating at 1800 MHz.

a. 30 dB
b. 11.2 dB
c. 15.5 dB
d. 28.78 dB

44. An electromagnetic wave is _____ polarized when the electric field lies wholly in one plane containing the direction of propagation.

a. horizontally
b. linearly
c. circularly
d. vertically

45. A device that reduces the intensity of light in fiver optics communication systems.

a. Reducer
b. Quality factor
c. Optical attenuator
d. Compressor

46. Propagation mode of microwave in a waveguide is known as _____.

a. TM
b. TE
c. SW
d. TEM

47. The width of the frequency band which is just sufficient to ensure the transmission of information at the rate and with the quality required under a specified condition and class of emission.

a. Occupied bandwidth
b. Reference frequency
c. Necessary bandwidth
d. Frequency tolerance bandwidth

48. A convenient method of determining antenna impedance.

a. Stub matching
b. Reactance circle
c. Smith chart
d. Trial and error

49. Which of the following falls under the high frequency band of the radio spectrum?

a. 8.2345MHz
b. 150.50 MHz
c. 2.4555 MHz
d. 8.3254 MHz

50. The electric field in a plane parallel to the earth's surface.

a. Elliptical polarization
b. Horizontal polarization
c. Vertical polarization
d. Circular polarization

51. The use of telecommunication for the transmission signals to initiate, modify or terminate functions of equipment at a distance.

a. Tracking
b. Telemetry
c. Telecommand

d. Space telemetry

52. The product of the power supplied to the antenna and its gain relative to a half-wave dipole in a given direction.
a. Peak envelope power
b. ERP
c. Rated power
d. Carrier power

53. The KU-band in the satellite service.
a. 14/11 GHz
b. 37/17 GHz
c. 8/ 7 GHz

54. The sinusoidal carrier is pulsed so that one of the binary states is represented by a carrier while the other is represented by its absence.
a. FSK
b. ASK
c. PSK
d. QAM

55. Width measured in degrees of a major lobe between end of the lobe at which the relative power is one half (3dB) its value from the lobe.
a. Bandwidth
b. Wavelength
c. Radiation
d. Beamwidth

56. The most common unit of noise measurement in white noise voltage testing.
a. APR
b. dBm
c. dBW
d. dBrn

57. Any governmental office responsible in discharging the obligations undertaken in the convention of the ITU and the regulation.
a. Administration
b. The union
c. Country
d. Telecommunications office

58. A large speaker having a large diameter (15 cm. and above).
a. Coaxial speaker
b. Woofer
c. Tweeter
d. Trixial speaker

59. Coaxial lines are used on those system operating _____.
a. below 2 GHz
b. at 300 Mhz
c. above 10 kHz
d. above 10 GHz

60. Determined the dynamic range for a 10 bit sign magnitude code.
a. 1023
b. 425
c. 511
d. 756

61. A coherent binary phase shift keyed BPSK transmitter operates at a bit rate of 20 Mbps with a carrier to noise ratio C/N 0f 8.8 Eb/No.
a. 73 dB
b. 62.4 dB
c. 81.8 dB
d. 8.8 dB

62. Receives and collects satellite.
a. LNB
b. Yagi-uda array
c. Satellite receiver
d. Satellite dish

63. What is the effect in over modulated amplitude modulated radio broadcasting transmission?
a. Interference to adjacent channel
b. Higher fidelity
c. Increase noise
d. Higher audio signal

64. Average power of a radio transmitter supplied to the antenna transmission line by a transmitter during one radio frequency cycle taken under the condition of no modulation.
a. Peak envelop power
b. Rated power
c. Carrier power
d. Mean power

65. A method of expressing the amplitude of a complex non-periodic signals such as speech.
a. Frequency
b. Wavelength
c. Volume
d. Pitch

66. Transmission that can occur only in both directions, but not at the same time.
a. simplex
b. half-duplex
c. full duplex
d. full/full duplex

67. Radio communication operation service between mobile and land stations or between mobile stations.
a. Land mobile satellite service
b. Maritime mobile service
c. Mobile service
d. Land mobile

68. 10^{15} is
a. terahertz
b. exahertz
c. petahertz
d. gigahertz

69. A radio communications service use in radio regulation between

specified fixed points provided primarily for the safety of air navigation and for the regular efficient and economical air transport.

a. Space Operation Service
b. Space Service
c. Aeronautical Mobile Service
d. Aeronautical Fixed Service

70. Harmonic suppressor connected to an antenna.

a. High pass filter
b. Low pass filter
c. Tank circuit
d. M-derived filter

71. The tendency of the sound energy to spread.

a. Rarefaction
b. Reflection
c. Refraction
d. Diffraction

72. An earth satellite whose period of revolution is equal the period of rotation of the earth about its axis.

a. Geosynchronous
b. Steerable
c. Passive
d. Active

73. A figure of merit used to measure the performance of a radiation detector

a. Noise equivalent power
b. Ripple factor
c. Safe factor
d. Quality factor

74. Radio wave concentration in the direction of the signal emitted by a directional antenna.

a. Back lobe radiation
b. Side lobe radiation
c. Major lobe radiation
d. Transmitted signal

75. What is the channel bandwidth of a standard analogue telephone system?

a. 300-500 Hz
b. 1200 kHz
c. 100-300 Hz
d. 300-3400 Hz

76. A satellite receives an uplink frequency of _____ MHz from a ground station of 3700 MHz

a. 8150 MHz
b. 1475 MHz
c. 2225 MHz
d. 5925 MHz

77. The outer conductor of a coaxial transmission line is always grounded at the

a. input only
b. input and output
c. output only
d. point of high SWR

78. Sound intensity is given as

a. df/dP
b. dE/dP
c. dA/dP
d. dP/dA

79. The lowest frequency produced by an instrument.

a. Harmonic
b. Fundamental
c. Midrange
d. 0 Hz

80. The reflector and director of an antenna array are considered as

a. parasitic elements
b. transcendental elements
c. feed-points
d. driven elements

81. The core of the optical fiver has _____.

a. a medium index of refraction
b. a lower index of refraction than the cladding
c. a lower index of refraction than air
d. a higher index of refraction than the cladding

82. What makes an antenna physically long but electrically short?

a. Top loading
b. Adding C in series
c. Adding L in series
d. All of these

83. An AM transmitter is rated 100W at 100% modulation. How much power required for the carrier?

a. 33.33 W
b. 66.66 W
c. 83.33 W
d. 100 W

84. Used for time division multiplexing.

a. Frequency modulation
b. Pulse modulation
c. SSB
d. Amplitude modulation

85. A means of beyond the line-of-sight propagation of microwave signal.

a. Space wave
b. Microwave link
c. Troposcatter
d. Point-to-point

86. Which of the following refers to the smallest beam of satellite antenna's radiation pattern?

a. Hemispheric beam
b. Spot beam
c. Zone beam
d. Global beam

87. Theoretical gain of a Hertian dipole.
a. 0 dB
b. 1.76 dB
c. 3 dB
d. 2.15 dB

88. Satellite system or part of a satellite system, consisting of only one satellite and the operating earth station.
a. Satellite system
b. Satellite network
c. Space system
d. Multi-satellite link

89. The difference between the original and reconstructed signal gives rise to
a. s factor
b. quantizing noise
c. S/N
d. fade margin

90. An impedance coil with resistance and inductance equal to 30Ω and 0.416 H respectively is connected in series with a 10 uF capacitor. What is the lower half-power frequency?
a. 78
b. 72.3
c. 83.7
d. none of these

91. Refers to a land station in a maritime mobile service.
a. Coast station
b. Ship earth station
c. Coast earth station
d. Maritime station

92. Modulation in which no signal is present between pulses.
a. Pulse modulation
b. QAM
c. PSK
d. FSK

93. In the resignation of bandwidth and emission, what letter in the first symbol represent a doubled-sideband type of modulation?
a. A
b. B
c. C
d. H

94. Loss due to the diffraction of light when it strikes on the irregularities formed during the manufacturing process of the fiver optics.
a. Absorption loss
b. Attenuation
c. Bending loss
d. Rayleigh scattering loss

95. What is the unit of electric field strength?
a. Watt/meter
b. Ohms/meter
c. Ampere/meter
d. Watt/meter^2

96. Refers to the first generation of local loop system in telecommunication technology.
a. GMS
b. DECT
c. Analogue cellular
d. TACS

97. An area on the surface of the earth within which the boresight of the steerable satellite beam intended to be pointed.
a. Effective boresight area
b. Countour boresight area
c. Coordination boresight area
d. Equivalent boresigth area

98. For a sample rate of 40 kHz, determine the maximum analog input frequency.
a. 30 kHz
b. 40 kHz
c. 20 kHz
d. 10 kHz

99. An antenna that can only receive a television signal.
a. Isotropic antenna
b. TVRO
c. Reference antenna
d. Yagi antenna

100. Halo is also called
a. flare
b. dark current
c. glitch
d. ghost

SOLUTION (MOCK BOARD EXAM IN COMMUNICATIONS ENGINEERING)

1. C 8 to 1.43 GHz
2. C Ultraviolet
3. B Dipole
4. D type of modulation of the main carrier
5. C Half-duplex operation
6. B Emission
7. D type of information to be transmitted
8. B Television
9. C Omnidirectional
10. C Chroma keying
11. A 50 dB
12. C Telemetry
13. B 1 dB
14. D All of these
15. A Isotropic
16. D PAM
17. B Ionospheric scatter
18. B All of these
19. C Pitch
20. C Stereo multiplexing
21. C Out of the band
22. D Circular polarization
23. A impulse noise
24. A Reflectometer
25. A Reduced carrier single sideband emission
26. D Land station
27. D Vertical polarization
28. C Telstar I
29. B T1
30. C 768 kbps

Solution:

Rate = (8 bits /channel) (12 channels) (8000 samples /s)

Rate = 768 kbps

31. C APDs
32. C 4.78 uV

Solution:

$R_T = (20\ k\Omega)(50\ k\Omega) / (20k\Omega + 50k\Omega)$

$R_T = 14.28\ k\Omega$

$e_{nT} = \sqrt{4(1.38x10^{-23})(290K)(100x10^{3})(14.28k\Omega)}$

$e_{nT} = 4.78\ uV$

33. A $1.2x\ 10^{-19}$ J

Solution:

E = hf, Joule (J)

where h = Planck's constant

$f = c/\lambda$

$f = 3x10^{8}$ m/s /1.55 um

$f = 1.935x\ 10^{14}$ Hz

$E = (6.6256x\ 10^{-34})(1.935x\ 10^{14})$

$E = 1.28\ x10^{-19}$ J

34. A 34.61 ns

Solution:

System rise time (ns) $= 1.1\sqrt{S^2 + D^2 + C^2}$

Where S = source rise time(ns) = 12 ns

D = detector rise time (ns) =12 ns

C = cable rise time (ns)

$38.55\ ns = 1.1\ \sqrt{(12)^2 + (12)^2 + C^2}$

C = 30.66 ns

35. D 4kHz
36. B Space diversity
37. C noise improvement factor
38. C Huygen's Principle
39. C Continous modulation
40. B 30 MHz
41. D F1 layer
42. C Bidirectional
43. D 28.17 dB

Solution:

$G(dB) = 7.5 + 20 \log f_{GHz} + 20 \log D_{ft}$

44. B linearly
45. C Optical attenuator
46. B TE
47. C Necessary bandwidth
48. C Smith chart
49. A 8.2345 MHz
50. B Horizontal polarization
51. C Telecommand
52. B ERP
53. A 14/11 GHz
54. B ASK
55. D beamwidth
56. A NPR
57. A Administrator
58. B Woofer
59. A below 2 GHz
60. C 511

Solution:

$DR = 2^n - 1$

n = 10 – 1

n = 9 bits (excluding sigh bit)

$DR = 2^9 - 1 = 511$

61. D 8.8 dB

Solution:

Eb/No (dB) = 10 log C/ N+ 10 log B/fb

where: 10 log C/N = 8.8 dB

fb = 20 Mbps

B = 20 MHz = fb for BPSK

Then Eb/No = 8.8 dB+ 10 log 20/20

= 8.8 dB

62. D Satellite disk
63. A Interference to adjacent channel
64. C Carrier power
65. C Volume
66. B Half-duplex
67. C Mobile Service
68. C Petahertz
69. D Aeronautical Fixed Service
70. B Low pass filter
71. D Diffraction
72. A Geosynchronous
73. A Noise equivalent power
74. C Major lobe radiation
75. D 300-3400 Hz
76. D 5925 MHz

Solution:

u= fd = 2225 MHz

225 MHz = fo = u wave oscillator frequency

u = 3700 + 2225

fu = 5925 MHz

77. B input and output
78 D dB/dA
79. B Fundamental
80. A parasitic elements
81. D a higher index of refraction than the cladding
82. B Cladding C in series
83. B 66.66 W

Solution:

$_T = P_c (1 + m^2 / 2$

With m = 1

$_T = 1.5\ P_c$

$P_c = 100W / 1.5 = 66.67\ W$

84. B Pulse modulation
85. C Troposcatter
86. B Spot beam
87. B 1.76 dB
88. B Sattellite network
89. B quantizing noise
90. B. 72.3 Hz

$f_1 = fr - (R/4\pi L) = 72.3$ Hz

91. A Coast station
92. A Pulse modulation
93. A A
94. C Rayleigh scattering loss
95. Bonus No particular answer
96. C Analogue cellular
97. A Effective boresight area
98. C 20 kHz

Solution:
fs = 2 fa
fa = fs/ 2 = 40 kHz/ 2
fa = 20 kHz

99. B TVRO

100. A flare