Electronic and communication 2010

1.The current I in the given network.
a) 1A
b) 3A
c) 5A
d) 7A

2.For the Delta- Wye transformation in given figure, the value of the resistance R is.
a) 1/3 ohms
b) 2/3 ohms
c) 3/2 ohms
d) 3 ohms

3.In the given network, the Thevenin's equivalent as seen by the load resistance Rl is
a) V=10 V, R= 2ohms
b) V=10V, R=3 ohms
c) V=15V, R= 2ohms
d) V=15V, R=3 ohms

4.The current I in a series R-L circuit with R=10 ohms and L=20mH is given by i=2sin500t A. If v is the voltage across the R-L combination then i
a) lags v by 45 degree
b) is in-phase with v
c) leads v by 45
d) lags v by 90

5.In thr given network, the mesh current I and the input impedance seen by the 50 V source, respectively, are
a) 125/13 A and 11/8 ohms
b) 150/13 A and 13/8 ohms
c) 150/13 A and 11/8 ohms
d) 125/13 A and 13/8 ohms

6.A voltage sourcehaving a source impedance Z = R + jX can deliver maximum Average power to a load impedance Z, when
a) Z = R + jX
b) Z = R
c) Z = jX
d) Z = R –jX

7.In the given circuit, the switch S is closed at t=0. Assuming that there is no initial Charge in the capacitor, the current i(t) for t>0 is
a) V/R e^ (-2t/RC)
b) V/R e^ (-t/RC)
c) V/2R e^ (-2t/RC)

d) V/2R e^ (-t/RC)

8.For the circuit in given figure, if e(t) is a ramp signal, the steady state value of the Output voltage v(t) is
a) 0
b) LC
c) R/L
d) RC

9.For the series RLC circuit in given figure, if w=1000 rad/sec, then the current I (in Amperes) is
a) 2 ∟-15
b) 2 ∟15
c) √2∟-15
d) √2∟15

10.The Y-parameter matrix (mA/V) of the two-port given network is
a) [2 -1 -1 2]
b) [2 1 -1 2]
c) [1 -2 -1 2]
d) [2 1 1 2]

11.The maximum number of trees of the given graph is
a) 16
b) 25
c) 100
d) 125

12.Given figure shows a graph and one of its trees. Corresponding to the tree, the group of branches that CAN NOT constitute a fundamental cut set is
a) 1,2,3
b) 1,4,6,8,3
c) 5,6,8,3
d) 4,6,7,3

13.The Y-parameter matrix of a network is given by Y=[1 1 -1 1] A/V. The Z11 parameter of the same network is
a) ½ ohms
b) 1/√2 ohms
c) 1 ohms
d) 2 ohms

14.For the given circuit, the switch was kept closed for a long time before opening it at t=0. The voltage v(0+) is
a) -10 V
b) -1 V
c) 0V

d) 10 V

15.The input impedance of a series RLC circuit operating at frequency W=√2w, w being the resonant frequency, is
a) R-j(wL/√2) ohms
b) R+j(wL/√2) ohms
c) R-j√2wL ohms
d) R-j√2wL ohms

16.The threshold voltage V is negative for
a) an n-channel enhancement MOSFET
b) an n-channel depletion MOSFET
c) an p-channel depletion MOSFET
d) an p-channel JFET

17.At a given temperature, a semiconductor with intrinsic carrier concentration ni= 10 ^ 16 / m^3 is doped with a donor dopant of concentration Nd = 10 ^ 26 /m^3. Temperature remaining the same, the hole concentration in the doped semiconductor is
a) 10 ^ 26 /m^3
b) 10 ^ 16 /m^3
c) 10 ^ 14 /m^3
d) 10 ^ 6 /m^3}

18.At room temperature, the diffusion and drift constants for holes in a P-type semiconductor were measured to be Dp = 10 cm^2/s and µp = 1200 cm^2/V-s, respectively. If the diffusion constant of electrons in an N-type semiconductor at the same temperature is Dn = 20 cm^2/s, the drift constant for electrons in it is
a) µn = 2400 cm^2/V-s
b) µn = 1200 cm^2/V-s
c) µn = 1000 cm^2/V-s
d) µn = 600 cm^2/V-s

19.A common LED is made up of
a) intrinsic semiconductor
b) direct semiconductor
c) degenerate semiconductor
d) indirect semiconductor

20.When operating as a voltage regulator, the breakdown in a Zener diode occurs due to the
a) tunneling effect
b) avalanche breakdown
c) impact ionization
d) excess heating of the junction.

21.If the common base DC current gain of a BJT is 0.98, its common emitter DC current gain is
a) 51

b) 49
c) 1
d) 0.02

22.Negative resistance characteristics is exhibited by a
a) Zener diode
b) Schottky diode
c) photo diode
d) Tunnel diode

23.Let En and Ep, respectively, represent the effective Fermi levels for electrons and holes during current conduction in a semiconductor. For lasing to occur in a P-N junction of band-gap energy 1.2 eV, (En - Ep) should be
a) greater than 1.2eV
b) less than 1.2eV
c) equal to 1.1eV
d) equal to 0.7eV

24.In a P-well fabrication process, the substrate is
a) N-type semiconductor and is used to build P-channel MOSFET
b) P-type semiconductor and is used to build P-channel MOSFET
c) N-type semiconductor and is used to build N-channel MOSFET
d) P-type semiconductor and is used to build N-channel MOSFET

25.In a MOS capacitor with n-type silicon substrate, the Fermi potential ¢ = -0.41 V and the flat-band voltage Vfb = 0V. The value of the threshold voltage Vt is
a) -0.82 V
b) -0.41 V
c) 0.41 V
d) 0.82
Refer given figure for question 26 and 27. Assume D1 and D2 to be ideal diodes.

26.Which one of the following statements is true?
a) Both D1 and D2 are ON.
b) Both D1 and D2 are OFF.
c) D1 is ON and D2 is OFF.
d) D2 is ON and D1 is OFF.

27.Values of Vo and I, respectively, are
a) 2V and 1.1 mA
b) 0V and 0 mA
c) -2V and 0.7 mA
d) 4V and 1.3 mA

28.In a BJT CASCODE pair, a
a) common emitter follows a common base

b) common base follows a common collector
c) common collector follows a common base
d) common base follows a common emitter

29.Inside a 741 op-amp, the last functional block is a
a) differential amplifier
b) level shifter
c) class-A power amplifier
d) class-AB power amplifier

30.For the MOSFET in the given circuit, the threshold voltage Vt = 0.5V, the process parameter KP = 150 μA/V^2 and W/L = 10. The values of Vd and Id, respectively, are
a) Vd = 4.5 V and Id = 1 mA
b) Vd = 4.5 V and Id = 0.5 mA
c) Vd = 4.8 V and Id = 0.4 mA
d) Vd = 6 V and Id = 0 mA

31.A negative feedback is applied to an amplifier with the feedback voltage proportional to the output current. This feedback increases the
a) input impedance of the amplifier
b) output impedance of the amplifier
c) distortion in the amplifier
d) gain of the amplifier

32.The early effect in a BJT is modeled by the small signal parameter
a) r0
b) r∏
c) gm
d) ß

33.For a given filter order, which one of the following type of filters has the least amount of ripple both in pass-band and stop-band?
a) Chebyshev type I
b) Bessel
c) Chebyshev type II
d) Elliptic

34.For a practical feedback circuit to have sustained oscillation, the most appropriate value of the loop gain T is
a) 1
b) -1
c) -1.02
d) 1.02

35.Assume the op-amps in given figure to be ideal. If the input signal vi is a sinusoid of 2V peak-to-peak and with zero DC component, the output signal vo is a

a) sine wave
b) square wave
c) pulse train
d) triangular wave

36.In a common source amplifier, the mid-band voltage gain is 40 dB and the upper cutoff frequency is 150kHz. Assuming single pole approximation for the amplifier the unity gain frequency fT is
a) 6 MHz
b) 15 MHz
c) 150 MHz
d) 1.5 GHz

37.An op-amp is ideal except for finite gain and CMRR. Given the open loop differential gain Ad=2000,CMRR = 1000, the input to the noninverting terminal is 5.002 V and the input to the inverting terminal is 4.999 V, the output voltage of the op-amp is
a) 14 V
b) 24 V
c) -6 V
d) -8 V

38.The op-amp in the circuit in given figure has a non-zero DC offset. The steady state value of the output voltage Vo is
a) –RC dvs(t)/ dt
b) – (1/RC)∫vs(t)dt
c) –V
d) +V

39.For the circuit in given figure, if the value of the capacitor C is doubled, the duty-cycle of the output waveform Vo
a) increases by a factor of 2
b) increases by a factor of 1.44
c) remains constant
d) decreases by a factor of 1.44

40.Assume the op-amp in the given circuit to be ideal. The value of the output voltage Vo is
a) 3.2 Vi
b) 4 Vi
c) 9 Vi
d) 10 Vi

41.The complement of the Boolean expression $F = (X + Y^- + Z)(X^- + Z^-)(X + Y)$ is
a) $XYZ+XZ^-+Y^-Z$
b) $X^-YZ^-+XZ+X^-Y^-$
c) $X^-YZ^-+XZ+YZ$
d) $XYZ+X^-Y^-$

42.The Boolean function F(A,B,C,D) = ∑(0,6,8,13,14) with don't care conditions d(A,B,C,D) = ∑(2,4,10) can be simplified to
a) $F = B^- D^- + CD^- + ABC^-$
b) $F = B^- D^- + CD^- + ABC^- D$
c) $F = AB^- D^- + CD^- + ABC^-$
d) $F = B^- D^- + CD^- + ABCD$

43.The Boolean function $F = A^- D^- + B^- D$ can be realized by one of the following figures
44. For the multiplexer in given figure, the Boolean expression for the output Y is
a) $A^- B^- + B^- C^- + AC$
b) $AB^- + B^- C^- + AC^-$
c) $AB^- + B^- C + AC$
d) $A^- B^- + B^- C + A^- C$

45. Which one of the following is TRUE?
a) Both latch and flip-flop are edge triggered.
b) A latch is level triggered and a flip-flop is edge triggered.
c) A latch is edge triggered and a flip-flop is level triggered.
d) Both latch and flip-flop are level triggered.

46. In a schottky TTL gate, the Schottky diode
a) increases the propagation delay
b) increases the power consumption
c) prevents saturation of the output transistor
d) keeps the transistor in cutoff region

47. For which one of the following ultraviolet light is used to erase the stored contents
a) PROM
b) EPROM
c) EEPROM
d) PLA

48. Which one of the following is NOT a synchronous counter
a) Johnson counter
b) Ring counter
c) Ripple counter
d) Up-down counter

49. In 8085 microprocessor, the accumulator is a
a) 4 bit register
b) 8 bit register
c) 16 bit register
d) 32 bit register

50. In the register indirect addressing mode of 8085 microprocessor, data is stored a) at the

address contained in the register pair
b) in the register pair
c) in the accumulator
d) in a fixed location of the memory

51. The output w[n] of the system shown in given figure is
a) x[n]
b) x[n-1]
c) x[n] – x[n-1]
d) 0.5(x[n-1] + x[n])

52. Which one of the following is a periodic signal
a) x(t) = 2 e^j(t+(p/4))
b) x[n] = u[n] + u[-n]
c) x[n] = ∑{∂[n-4k]-∂[n-1-4k]} where k = -∞to ∞
d) x(t) = e^ (-1+j)t

53. If the input-output relation of a system is y(t) = ∫x(t) dt where t = -∞ to 2t
a) linear, time-invariant and unstable
b) linear, non-causal and unstable
c) linear, causal and time invariant
d) non-causal, time invariant and unstable

54. Which one of the can be the magnitude of the transfer function | H(jw) | of a causal system

55. Consider the function H(jw) = H1(w) + jH2(w), where H1(w) is an odd function and H2(w) is an even function. The inverse Fourier transform of H(jw) is
a) a real and odd function b) a complex function
c) a purely imaginary function
d) a purely imaginary and odd function
56. The laplace transform of given signal is
a) –A((1-e^cs)/s)
b) A((1-e^cs)/s)
c) A((1-e^-cs)/s)
d) –A((1-e^-cs)/s)
57. If X(z) is the z-transform of x[n] = (1/2)^ |n|, the ROC of X(z) is
a) |z| > 2
b) |z| < 2
c) 0.5<|z|<2

d) the entire z-plane
58. In a linear phase system, tg the group delay and tp the phase delay are
a) constant and equal to each other
b) tg is a constant and tp is proportional to w
c) a constant and tg is proportional to w
d) tg is proportional to w and tp is proportional to w

59. A signal m(t), band-limited to a maximum frequency of 20 kHz is sampled at a frequency fs kHz to generate s(t). An ideal low pass filter having cut-off frequency 37 kHz is used to reconstruct m(t) from s(t). The maximum value of fs required to reconstruct m(t) without distortion is
a) 20 kHz
b) 40kHz
c) 57 kHz
d) 77 kHz

60. If the signal x(t) shown in given figure is fed to an LTI system having impulse response h(t) as shown in given figure, the value of the DC component present in the output y(t) is
a) 1
b) 2
c) 3
d) 4

61. The characteristic equation of an LTI system is given as s^3 + Ks^2 + 5s + 10. When the system is marginally stable, the value of K and the sustained oscillation frequency w, respectively, are
a) 2 and 5
b) 0.5 and √5
c) 0.5 and 5
d) 2 and √5

62. The time required for the response of a linear time-variant system to reach half the final value for the first time is
a) delay time
b) peak time
c) rise time
d) decay time

63. The signal flow graph of the given network is

64. Let c(t) be the unit step response of a system with transfer function K(s+a)/(s+K). If c(0+)=2 and c(∞)=10, then the values of a and K, respectively, are
a) 2 and 10
b) -2 and 10
c) 10 and 2
d) 2 and -10

65. The loop transfer function of an LTI system is G(s)H(s)= K(s+1)(s+5) / s(s+2)(s+3). For K>0, the point on the real axis that DOES NOT belong to the root locus of the system is
a) -0.5
b) -2.5
c) -3.5

d) -5.5

66. The state space equation of the circuit shown in given figure for x1=v0, x2=I is

67. The open loop gain of a unity feedback system is G(s)=wn^2 / s(s+2wn). The unit step response c(t)
of the system is

69. The angles of the asymptotes of the root loci of the equation s^3 + 5s^2 + (K+2)s + K = 0, for
0<=K<∞, are
a) 0 and 270
b) 0 and 180
c) 90 and 270
d) 90 and 180

70. The bode plot corresponding to a proportional derivative controller is the one shown in given figure

71. In frequency modulation, the instantaneous
a) amplitude of the carrier signal is varied with the instantaneous amplitude of the message signal
b) amplitude of the carrier signal is varied with the instantaneous frequency of the message signal
c) frequency of the carrier signal is varied with the instantaneous amplitude of the message signal
d) frequency of the carrier signal is varied with the instantaneous frequency of the message signal

72. If X is a zero mean Gaussian random variable, then P{X<=0} is
a) 0
b) 0.25
c) 0.5
d) 1

73. If a single-tone amplitude modulated signal at a modulation depth of 100% transmits a total power of 15W, the power in the carrier component is
a) 5W
b) 10W
c) 12W
d) 15W

74. In a superheterodyne receiver, rejection of the image signal can be achieved by using a
a) higher local oscillatorn frequency
b) crystal oscillator
c) narrow band IF filter

d) narrow band filter at RF stage

75. The number of bbits per sample of a PCM system depends upon the
a) sampler type
b) quantizer type
c) number of levels of the quantizer
d) sampling rate

76. Which one of the following is used for the detection of AM-DSB-SC signal
a) Ratio detector
b) Foster-Seeley discriminator
c) Product demodulator
d) Balanced-slpoe detector

77. Which one of the following signal pairs can represent a BPSK signal
a) A cos2pfct, A sinpfct
b) A cos2pfct, - A sinpfct
c) - A cos2pfct, A sinpfct
d) A sin2pfct, A cospfct

78. Which one of the following can be used for the detection of the noncoherent BPSK signal
a) matched filter
b) phase-locked loop
c) envelope detector
d) product demodulator

79. Bits of duration Tb are to be transmitted using a BPSK modulation with a carrier of frequency Fc Hz. The power spectral density of the transmitted signal has the first null at the normalized frequency
a) |F – Fc|Tb = 0
b) |F – Fc|Tb = 1
c) |F – Fc|Tb = 2
d) |F – Fc|Tb = 4

80. The probability of bit error of a BPSK modulation scheme, with transmitted signal energy per bit Eb, in an additive white Gaussian noise channel having one-sided power spectral density N0, is
a) (1/2) erfc(Eb/2N0)
b) (1/2) erfc$\sqrt{}$(Eb/2N0)
c) (1/2) erfc(Eb/N0)
d) (1/2) erfc$\sqrt{}$ (Eb/N0)

81. For a given transmitted pulse p(t), 0<=t<=T, the impulse response of a filter matched to the received signal is
a) –p(t-T), 0<=t<=T
b) –p(T-t), 0<=t<=T

c) p(t-T), 0<=t<=T
d) p(T-t), 0<=t<=T

82. The multiple access communication scheme in which each user is allocated the full available channel spectrum for a specified duration of time is known as
a) CDMA
b) FDMA
c) TDMA
d) MC-CDMA

83. GSM system uses TDMA with
a) 32 users per channel
b) 16 users per channel
c) 8 users per channel
d) 4 users per channel

84. If Rx(t) is the auto-correlation function of a zero-mean wide-sense stationary random process X, then which one of the following is NOT true?
a) Rx(t) = Rx(-t)
b) Rx(t) = -Rx(-t)
c) sx^2 = Rx(0)
d) |Rx(t)| <=Rx(0)

85. If E denotes the expectation operator, then E[X-EX]^3 of a random variable X is
a) EX^3 – E^3X
b) EX^3 + 2E^3X – 3EX Ex^2
c) 3EX^3 – E^3X
d) 2EX^3 + E^3X – 3EX EX^2

86. A discrete memoryless source produces symbols m1,m2,m3 and m4 with probabilities 1/2, 1/4 , 1/8 and 1/8, respectively. The entropy of the source is
a) ¼
b) 1
c) 7/4
d) 2

87. A channel has a signal-to-noise ratio of 63 and bandwidth of 1200 Hz. The maximum data rate that can be sent through the channel with arbitrary low probability of error is
a) 600 bps
b) 1200 bps
c) 4800 bps
d) 7200 bps

88. For the vectors A = X ax + Y ay and B = Z az, del . (A X B) is
a) 0
b) 1

c) XZ
d) YZ

89. Which one of the following relations represents Strokes' theorem (symbols have their usual meaning)?
a) ∫s del X A.ds = 0
b) ∫L A.dl = ∫s del X A.ds
c) ∫s A X dS = -∫v (del X A)dv
d) ∫v del.Adv = ∫s A.ds

90. Which one of the following relations is not correct (symbols have their usual meaning)?
a) del X E = - ∂B/∂t
b) del X H = J + ∂E/∂t
c) del.D = ?v
d) del.B = 0

91. The electric field component of a uniform plane wave propagating in a lossless magnetic dielectric medium is given by E(t,z)=ax 5cos(10^9 t – 20/3 z)V/m. If ?0 represents the intrinsic impedance of the free space, the corresponding magnetic field component is given by
a) H(t,z)= ay 5/2 ?0 cos(10^9t – 20/3 z)A/m
b) H(t,z)= ay 10/ ?0 cos(10^9t – 20/3 z)A/m
c) H(t,z)= az 5/2 ?0 cos(10^9t – 20/3 z)A/m
d) H(t,z)= az 10/ ?0 cos(10^9t – 20/3 z)A/m

92. The skin depth of a non-magnetic conducting material at 100 MHz is 0.15 mm. The distance which a plane wave of frequency 10 GHz travels in this material before its amplitude reduces by a factor of e^-1 is
a) 0.0015 mm
b) 0.015 mm
c) 0.15 mm
d) 1.5 mm

93. A lossless transmission line has a characteristic impedance of 100 ohms and an inductance per unit length of 1 µH/m. If the line is operated at 1 GHz, the propagation constant ß is
a) 2p rad/m
b) 20p/3 rad/m
c) 20p rad/m
d) 2p *10^5 rad/m

94. When a load resistance Rl is connected to a lossless transmission line of characteristic impedance 75 ohms, it results in a VSWR of 2. The load resistance is
a) 100 ohms
b) 75√2 ohms
c) 120 ohms
d) 150 ohms

95. A two-port network characterized by the S-parameter matrix, [S] = [0.3 L0 0.9 L90 0.9 L90 0.2 L0] Is
a) both reciprocal and lossless
b) reciprocal, but not lossless
c) lossless, but not reciprocal
d) neither reciprocal nor lossless

96. A lossless air filled rectangular waveguide has internal dimensions of a cm * b cm. If a=2b and the cutoff frequency of the TE02 mode is 12 GHz, the cutoff frequency of the dominant mode is
a) 1 GHz
b) 3 GHz
c) 6 GHz
d) 9 GHz

97. A Hertzian dipole antenna is placed at the origin of a coordinate system and it is oriented along z-axis. In which one of the following planes the radiation pattern of the antenna has a circular shape?
a) x=0
b) y=0
c) z=0
d) ø=45

98. Which one of the following statements is not true?
a) Antenna losses are taken into account in calculating its power gain
b) For an antenna which does not dissipate any power, the directive gain and the power gain are equal c) Directivity of an antenna is the maximum value of its directive gain
d) The directive gain of a Hertzian dipole is same in all direction

99. The directivity of a half dipole antenna is
a) 1.0
b) 1.5
c) 1.64
d) 2

100. Which one of the following is not true for a step index optical fibre?
a) It can support multiple modes
b) HE11 mode is its lowest order mode
c) The refractive index of the cladding is higher than that of the core
d) At a given wavelength, single mode operation is possible by proper choice of core diameter, core and cladding refractive indices.