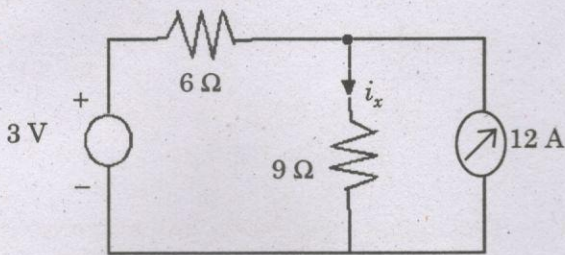56. For the circuit shown in the figure, the Thevenin equivalent voltage (in Volts) across terminals a-b is
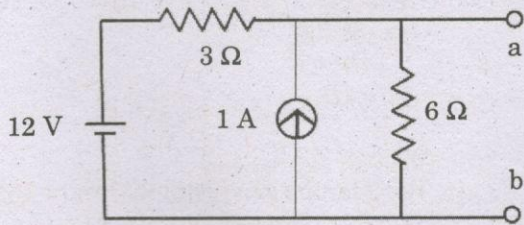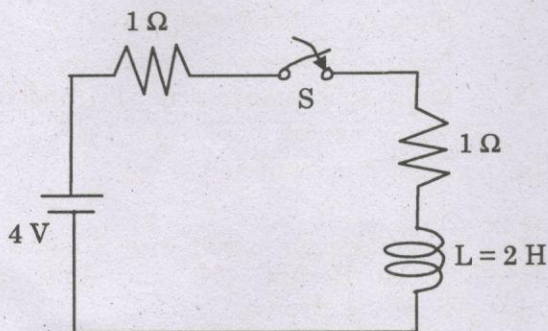

1. 6
2. 2
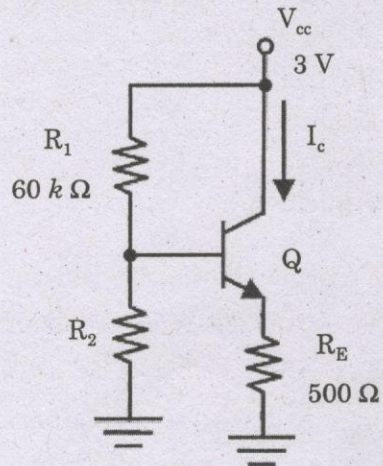3. 10
4. 4

57. The current i_x in the network is

1. 1 A
2. $\frac{1}{2}$ A
3. $\frac{1}{3}$ A
4. $\frac{4}{5}$ A

58. In the circuit shown in figure, the switch s is closed at $t = 0$ then the steady state value of the current is


1. 1 Amp
2. 2 Amp
3. 3 Amp
4. $\frac{4}{3}$ Amp

59. In the circuit shown below, the silicon npn transistor Q has a very high value of β. The required value of R_2 in $k\,\Omega$ to produce $I_C = 1$ mA is

1. 20
2. 30
3. 40
4. 50

60. In the figure, assume that the forward voltage drops of the PN diode D_1 and Schotty diode D_2 are 0.7 V and 0.3 V respectively. If ON denotes conducting state of the diode and OFF denotes non conducting state of the diode, then in the circuit
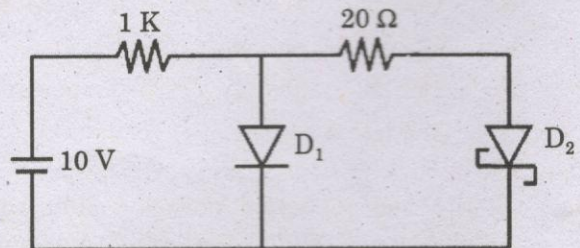
1. Both D_1 and D_2 are ON
2. D_1 is ON and D_2 is OFF
3. Both D_1 and D_2 are OFF
4. D_1 is OFF and D_2 is ON

NG 16 (GROUP A)

61. In a UJT, maximum value of charging resistance is associated with
    1. Peak point
    2. Valley point
    3. Any point between peak and valley point
    4. after the valley point

62. A highly stable resonance characteristic is the property of a ——————— oscillator.
    1. Hartley
    2. Colpitts
    3. Crystal
    4. Weinbridge

63. In the circuit shown, the silicon BJT has $\beta = 50$. Assume $V_{BE} = 0.7\ V$ and $V_{CE}(sat) = 0.2\ V$. Which one of the following statements is correct?
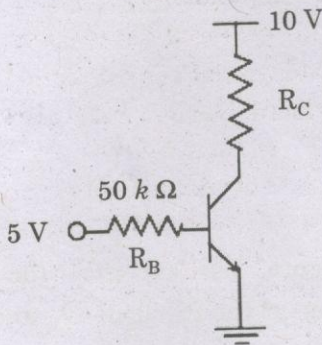


   1. For $R_C = 1\ k\Omega$, the BJT operates in the saturation region
   2. For $R_C = 3\ k\Omega$, the BJT operates in the saturation region
   3. For $R_C = 20\ k\Omega$, the BJT operates in the cut-off region
   4. For $R_C = 20\ k\Omega$, the BJT operates in the linear region

64. A 10-V dc regulator power supply has a regulation of 0.005 per cent. Its output voltage will vary within an envelope of ——————— millivolt.
    1. $\pm\ 2.5$
    2. $\pm\ 0.5$
    3. $\pm\ 5$
    4. $\pm\ 0.05$

65. In the circuit shown in the figure, if $C = 0$, the expression for Y is
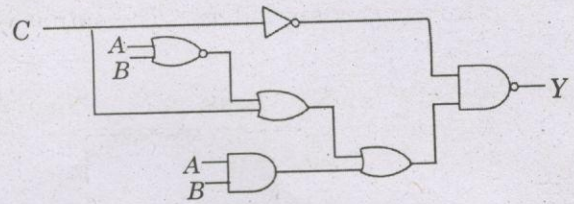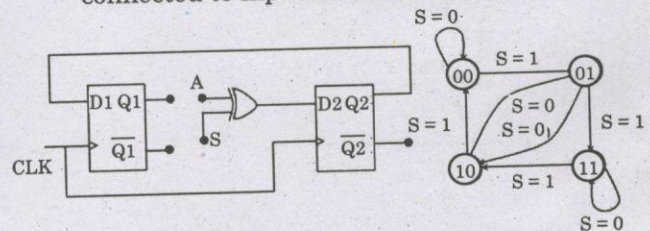

   1. $Y = AB' + A'B$
   2. $Y = A + B$
   3. $Y = A' + B'$
   4. $Y = AB$

66. The Boolean expression
    $F(X, Y, Z) = X'YZ' + XY'Z' + XYZ' + XYZ$
    converted into the canonical product of sum (POS) form is
    1. $(X + Y + Z)(X + Y + Z')(X + Y' + Z')$
       $(X' + Y + Z')$
    2. $(X + Y' + Z)(X' + Y + Z')(X' + Y' + Z)$
       $(X' + Y' + Z')$
    3. $(X + Y + Z)(X' + Y + Z')(X + Y' + Z)$
       $(X' + Y' + Z')$
    4. $(X + Y' + Z')(X' + Y + Z)(X' + Y' + Z)$
       $(X + Y + Z)$

67. The digital logic shown in the figure satisfies the given state diagram when Q1 is connected to input A of the XOR gate

   Suppose the XOR gate is replaced by an XNOR gate. Which one of the following options preserves the state diagram?
   1. Input A is connected to $Q\,2'$
   2. Input A is connected to $Q\,2$
   3. Input A is connected to $Q\,1'$ and S is complemented
   4. Input A is connected to $Q\,1'$

68. In a half-subtractor circuit with X and Y as inputs, the Borrow (M) and Difference $(N = X - Y)$ are given by
    1. $M = X \oplus Y,\ N = XY$
    2. $M = XY,\ N = X \oplus Y$
    3. $M = X'Y,\ N = X \oplus Y$
    4. $M = XY,\ N = (X \oplus Y)'$

69. In the circuit shown, the op-amp has finite input impedance, infinite voltage gain and zero input offset voltage. The output voltage V_{out} is
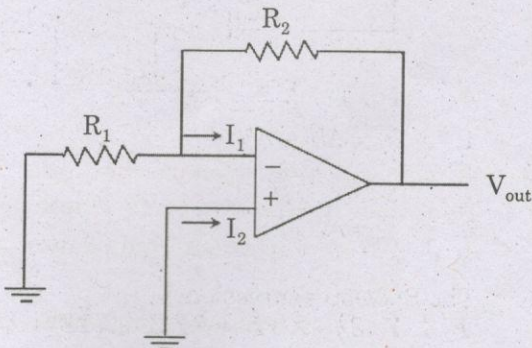
1. $-I_2(R_1 + R_2)$
2. $I_2 R_2$
3. $I_1 R_2$
4. $-I_1(R_1 + R_2)$

70. A voltage regulator is a circuit which
   1. Converts the ac voltage to dc voltage
   2. Smoothens the ac variation in dc output voltage
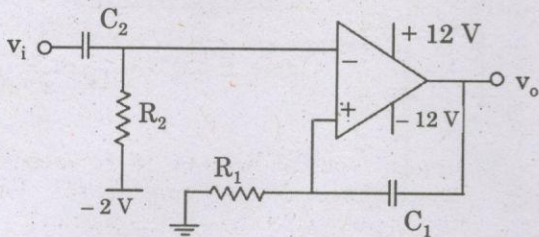   3. Maintains a constant dc output voltage inspite of the fluctuations in ac input voltage or load current
   4. None of the above

71. The circuit shown represents

1. A bandpass filter
2. A voltage controlled oscillator
3. An amplitude modulator
4. A monostable multivibrator

72. In an AC, co-ordinate potentiometer, the currents in the phase and quadrature potentiometer are adjusted to be
   1. out of phase by 90°
   2. out of phase by 60°
   3. out of phase by 30°
   4. out of phase by 0°

73. The ratio of maximum displacement deviation to full scale deviation of the instrument is called
   1. static sensitivity
   2. dynamic deviation
   3. linearity
   4. precision or accuracy

74. Two voltmeters have the same range 0 – 400 V. The internal impedance are 30,000 Ohms and 20,000 Ohms. If they are connected in series and 600 V be applied across them, the readings are
   1. 360 V and 240 V
   2. 300 V each
   3. 400 V and 200 V
   4. one of the meters is out of the range and other 100 V

75. The receive buffer of serial data buffer is a
   1. serial-in parallel-out register
   2. parallel-in serial-out register
   3. serial-in serial-out register
   4. parallel-in parallel-out register

76. An 8085 assembly language program is given below. Assume that the carry flag is initially unset. The content of the accumulator after the execution of the program is

   MVI A,07H
   RLC
   MOV B,A
   RLC
   RLC
   ADD B
   RRC

   1. 8 CH
   2. 64 H
   3. 23 H
   4. 15 H

77. In 8086 microprocessor one of the following statements is not true.
   1. Coprocessor is interfaced in MAX mode
   2. Coprocessor is interfaced in MIN mode
   3. I/O can be interfaced in MAX / MIN mode
   4. Supports pipelining

78. Maxwell's equations of Electromagnetics are not applicable to
    1. Isotropic media
    2. Non homogenous media
    3. Medium moving with respect to system of co-ordinates
    4. Non linear media

79. A charge Q is moved a distance 'r' on an equipotential line. The work done in moving the charge is
    1. Q.r
    2. QV/r
    3. V/r
    4. Zero

80. Two plates of a parallel plate capacitor after being charged from a constant voltage source are separated apart by means of insulated handles, then the
    1. Voltage across the plates increases
    2. Voltage across the plates decreases
    3. Charge on the capacitor decreases
    4. Charge on the capacitor increases

81. An antenna is cut for a resonant frequency of 10 MHz, if the antenna can handle a bandwidth of 5 MHz, its quality factor is
    1. 10
    2. 5
    3. 2
    4. 1

82. A half wave dipole antenna is required to radiate a signal of 100 MHz. Assuming a velocity factor of the antenna elements to be 0.8, the antenna length should be
    1. 3 m
    2. 2.7 m
    3. 1.5 m
    4. 1.2 m

83. Of the following antenna types, determine the antenna which does not have Omni-directional radiation pattern
    1. Log periodic antenna
    2. Half wave dipole antenna
    3. Marconi antenna
    4. Discone Antenna

84. A transmission line having a reflection co-efficient of 1/3 when terminated in a certain load would have VSWR of
   1. 2
    2. 0.5
    3. 3
    4. 1/3

85. A non resonant transmission line has no reflections irrespective of the length because
    1. Its characteristic impedance is very small
    2. Its characteristic impedance is very large
    3. It is always terminated in its characteristic impedance
    4. None of the above

86. A 75 Ω line is terminated in a load of 100 Ω. Percentage of incident power reflected is
    1. 10
    2. 14
    3. 2
    4. 25

87. In the transmission line shown, the impedance Z_{in} (in ohms) between node A and the ground is
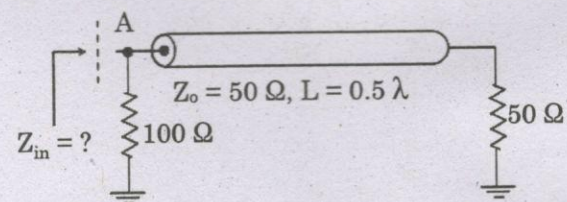
    1. 25
    2. 33.33
    3. 50
    4. 100

88. The wider dimension of the rectangular waveguide is 2.5 cm for TE_{10} mode of propagation. The cut off frequency is
    1. 6 GHz
    2. 12 GHz
    3. 18 GHz
    4. 24 GHz

89. The wavelength of the wave propagating in a waveguide is
1. Smaller than free space wavelength
2. Greater than free space wavelength
3. Directly proportional to the group velocity
4. Inversely proportional to the phase velocity

90. The characteristic impedance of an air dielectric rectangular waveguide made from non magnetic material mainly depends on
1. The cut off wavelength
2. The guide wavelength
3. The narrow and wide dimensions of the waveguide
4. The propagating mode

91. Which of the following is used as a high power microwave oscillator?
1. Thyratron
2. Magnetron
3. Klystron
4. Reflex-klystron

92. Oscillators of a klystron tube are maintained by
1. bunches of electrons passing the cavity grids
2. plate-to-cathode feedback
3. feedback between the accelerating grid and the repeller
4. circulating bunches of electrons within the cavities

93. The Gunn diode oscillator
1. Is capable of generating continuous microwave power of the order of kilowatt
2. Generates frequencies which are below 100 MHz
3. Operates over a positive resistance characteristic
4. Depends on the formation of charge domain

94. Pulse Code Modulation requires a transmission bandwidth that is lower / higher than that of Amplitude Modulation and for the transmission of bandlimited speech PCM requires a channel bandwidth of ——————— kHz.
1. lower, 4
2. lower, 16
3. higher, 32
4. higher, 64

95. With reference to TV signals which of the following statement is correct?
1. Picture is AM, Sound is AM
2. Picture is AM, Sound is FM
3. Picture is FM, Sound is AM
4. Picture is FM, Sound is FM

96. The amount of frequency deviation is dependent on the intelligence frequency in
1. An FM signal
2. A PM signal
3. Both FM and PM Signals
4. Neither PM and FM Signals

97. The effectiveness of distinguishing the signal from noise and interference in a received wave is defined by the ——————— of the eye opening.
1. width
2. height
3. eye closure rate
4. all of the above

98. A binary PAM wave with a bit duration of $1\mu s$ is to be transmitted over a baseband channel. The transmission bandwidth required for an ideal Nyquist pulse shaped signal transmission is
1. 2 MHz
2. 1 MHz
3. 500 kHz
4. 100 kHz

99. The effective rate at which transmission happens over a rate 2/3 Convolutional Coded, 512-QAM system is
1. 4 bits per symbol
2. 6 bits per symbol
3. 8 bits per symbol
4. 16 bits per symbol

100. The Selective Repeat ARQ scheme _____ the buffer requirement when compared to the Stop and Wait ARQ scheme.

1. increases

2. does not change

3. does not need

4. decreases

101. The end-to-end delivery of packets is handled by the following protocol layer

1. Physical Layer

2. Data Link Layer

3. Network Layer

4. Transport Layer

102. Which protocol does Ping use?

1. TCP

2. ARP

3. ICMP

4. BootP

103. The use of an Avalanche Photodiode Detector in a fiber optic receiver results in

1. Increased Sensitivity and Increased Bandwidth

2. Increased Sensitivity and Decreased Bandwidth

3. Decreased Sensitivity and Increased Bandwidth

4. Decreased Sensitivity and Decreased Bandwidth

104. A standard single mode fiber with dispersion of -16 ps/nm.km, is used for light transmission at 1550 nm emitted by a Laser source with 10 nm spectral width. The total signal spread accrued at the end of a fiber span of 100 km length, would be

1. 8 ps

2. 8 ns

3. 16 ps

4. 16 ns

105. In a Fabry Perot Cavity Laser, the number of longitudinal laser modes is dictated by the

1. Cavity Gain and the Confinement layers

2. Cavity Gain and Width of the active layer

3. Cavity Gain and Length of the active layer

4. All of the above

106. An input $x(t) = e^{-2t}u(t) + \delta(t-6)$ is applied to an LTI system with impulse response $h(t) = u(t)$. The output is

1. $0.25\left[1 - e^{-2t}\right]u(t) + u(t+6)$

2. $0.25\left[1 - e^{-2t}\right]u(t) + u(t-6)$

3. $0.5\left[1 - e^{-2t}\right]u(t) + u(t+6)$

4. $0.5\left[1 - e^{-2t}\right]u(t) + u(t-6)$

107. If $F(s) = \dfrac{2s+3}{s^2 + 4s + 7}$, then the initial and final values of $f(t)$ are

1. 0, 2

2. 2, 0

3. 0, 2/7

4. 2/7, 0

108. The period of the signal $x(n) = 2\cos(0.01\pi n + 0.5)$ is

1. 200

2. 100

3. 0.01π

4. 0.5

109. Consider two real sequences with time–origin marked by the bold value

$x_1[n] = \{1, 2, 3, 0\}$, $x_2 = \{1, 3, 2, 1\}$

Let $X_1(k)$ and $X_2(k)$ be 4 point DFT of $x_1[n]$ and $x_2[n]$, respectively. Another sequence $x_3[n]$ is derived by taking 4 point inverse DFT of $x_3(k) = x_1(k) x_2(k)$. The value of $x_3[2]$ is

1. 22

2. 12

3. 11

4. 8

110. The first six points of an 8-point DFT of a real-valued sequence are 5, $1-j3$, 0, $3-j4$, 0 and $3-j4$. The last two points are

  1.   0, $1-j3$

  2.   0, $1+j3$

  3. $1+j3$, 5

  4. $1-j3$, 5

111. The window having the narrowest main lobe is the

  1.   Hamming

  2.   Kaiser

  3.   Hanning

  4.   Rectangular

112. The filter that has a magnitude response with ripples in passband and stopband is

  1.   Elliptic filter

  2.   Chebyshev filter

  3.   Butterworth filter

  4.   All pass filter

113. The characteristic equation of an LTI system is given by

$F(s) = s^5 + 2s^4 + 3s^3 + 6s^2 - 4s - 8 = 0$. The number of roots that lie strictly in the left half s-plane is

  1.   3

  2.   4

  3.   2

  4.   6

114. The pole-zero diagram of a causal and stable discrete-time system is shown in the figure. The zero at the origin has multiplicity 4. The impulse response of the system is $h[n]=1$, we can conclude
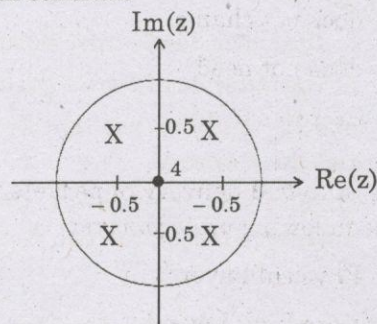
  1. $h[n]$ is real for all n

  2. $h[n]$ is purely imaginary for all n

  3. $h[n]$ is real for only even n

  4. $h[n]$ is purely imaginary for only odd n

115. In the root locus plot shown in the figure, the pole/zero marks and the arrow have been removed. Which one of the following transfer functions has this root locus?
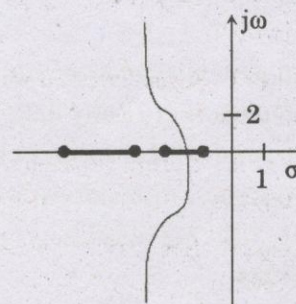
  1. $\dfrac{s+1}{(s+2)(s+4)(s+7)}$

  2. $\dfrac{s+4}{(s+1)(s+2)(s+7)}$

  3. $\dfrac{s+7}{(s+1)(s+2)(s+7)}$

  4. $\dfrac{(s+1)(s+2)}{(s+4)(s+7)}$