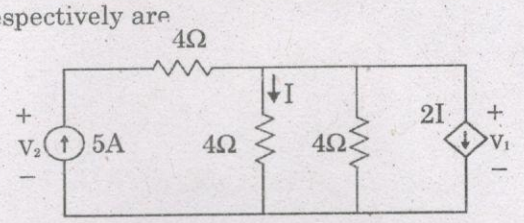
(Answer ALL questions)

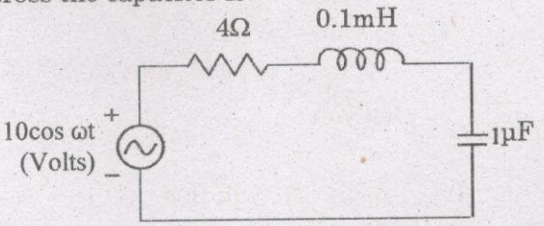
56. In the given circuit, the values of V_1 and V_2 respectively are



1. 5V, 25V
2. 10V, 30V
3. 15V, 35V
4. 0V, 20V

57. A network N is to be connected to load of 500 ohms. If the Thevenin's equivalent voltage and Norton's equivalent current of N are 5 Volts and 10mA respectively, the current through the load will be
1. 10mA
2. 5mA
3. 2.5mA
4. 1mA

58. In the circuit shown, at resonance, the amplitude of the sinusoidal voltage (in Volts) across the capacitor is

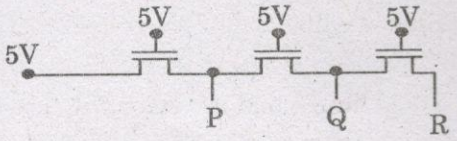


1. 2.5 V
2. 10 V
3. 25 V
4. 1 V

59. When a silicon diode having a doping concentration of $N_A = 9\times10^{16}\,cm^{-3}$ on p-side and $N_D = 1\times10^{16}\,cm^{-3}$ on n-side is reverse biased, the total depletion width is found to be $3\,\mu m$. Given that the permittivity of silicon is 1.04×10^{-12} F/cm, the depletion width on the p-side and the maximum electric field in the depletion region, respectively, are
1. $2.7\,\mu m$ and 2.3×10^5 V/cm
2. $0.3\,\mu m$ and 4.15×10^5 V/cm
3. $0.3\,\mu m$ and 0.42×10^5 V/cm
4. $2.1\,\mu m$ and 0.42×10^5 V/cm

60. Consider two BJTs biased at the same collector current with area $A_1 = 0.2\,\mu m\times0.2\,\mu m$ and $A_2 = 300\,\mu m\times300\,\mu m$. Assuming that all other device parameters are identical, kT/q = 26 mv, the intrinsic carrier concentration is $1\times10^{10}\,cm^{-3}$ and $q = 1.6\times10^{-19}$ C, the difference between the base emitter voltage (in mV) of the two BJTs (i.e V_{BE1} - V_{BE2}) is
1. 451
2. 381
3. 421
4. 300

61. In the following circuit employing pass transistor logic, all NMOS transistors are identical with a threshold voltage of 1 V. Ignoring the body-effect, the output voltages at P,Q and R are



1. 4 V, 3 V, 2 V
2. 5 V, 5 V, 5 V
3. 4 V, 4 V, 4 V
4. 5 V, 4 V, 3 V

62. The frequency of oscillation of a tunnel-collector oscillator having $L = 30\,\mu H$ and C = 300pf is Near by
1. 267 kHz
2. 1677 kHz
3. 1.68 kHz
4. 2.67 MHz

63. A BJT is biased in forward active mode, Assume $V_{BE} = 0.7$, kT/q = 25mV and reverse saturation current $I_S = 10^{-13}$ A, The transconductance of the BJT (in mA/V) is
1. 1.75
2. 5.785
3. 2.325
4. 7

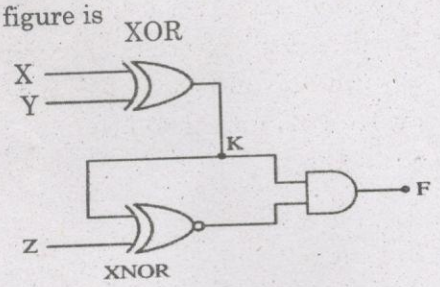
64. Which is preferred to attain higher input resistance and the output amplitude equal to input?

1. Voltage follower
2. Voltage series feedback amplifier
3. Voltage shunt feedback amplifier
4. Inverter

65. A function of Boolean variables X, Y and Z is expressed in terms of the min-terms as $F(X, Y, Z) = \Sigma(1, 2, 5, 6, 7)$. Which one of the product of sums given below is equal to the function F(X, Y, Z)?

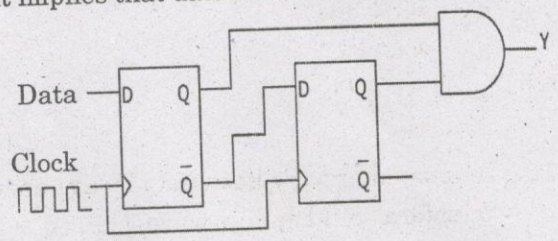
1. $(X'+Y'+Z')(X'+Y+Z)(X+Y'+Z')$
2. $(X+Y+Z)(X+Y'+Z')(X'+Y+Z)$
3. $(X'+Y'+Z)(X'+Y+Z')(X+Y'+Z)$ $(X+Y+Z')(X+Y+Z)$
4. $(X+Y+Z')(X'+Y+Z)(X'+Y+Z')$ $(X'+Y'+Z)(X'+Y'+Z')$

66. The output F in the digital logic circuit shown in the figure is



1. F = X'YZ + XY'Z
2. F = X'YZ' + XY'Z
3. F = X'Y'Z + XYZ
4. F = X'Y'Z' + XYZ

67. When the output Y in the circuit below is '1', it implies that data has

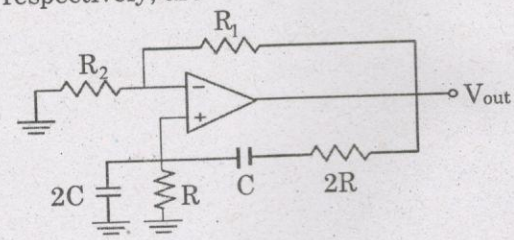


1. changed from 0 to 1
2. changed from 1 to 0
3. changed in either direction
4. not changed

68. Two D flip flops are connected as a synchronous counter that goes through the following Q_BA_A sequence 00->11->01->10->00->.....
The combination to the inputs D_A and D_B are

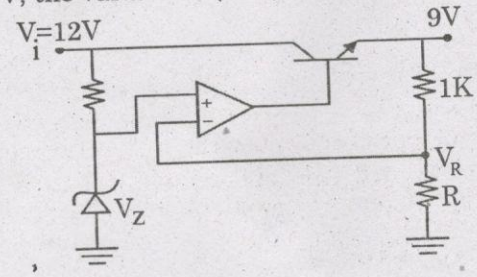
1. $D_A = Q_B$; $D_B = Q_A$
2. $D_A = Q_A$; $D_B = Q_B$
3. $D_A = (Q_AQ_B' + Q_A'Q_B)$; $D_B = Q_A'$
4. $D_A = (Q_AQ_B + Q_A'Q_B')$; $D_B = Q_B'$

69. The circuit shown in the figure has an ideal opamp. The oscillation frequency and the condition to sustain the oscillations, respectively, are



1. $\frac{1}{CR}$ and $R_1 = R_2$
2. $\frac{1}{CR}$ and $R_1 = 4R_2$
3. $\frac{1}{2CR}$ and $R_1 = R_2$
4. $\frac{1}{2CR}$ and $R_1 = 4R_2$

70. In the voltage regulator circuit shown in the figure, the op-amp is ideal. The BJT has $V_{BE} = 0.7\,V$ and $\beta = 100$ and the zener voltage is 4.7 V. For a regulated output of 9 V, the value of R (in Ω) is



1. 1000
2. 1093
3. 750
4. 370

71. Consider a four bit D to A converter. The analog value corresponding to digital signals of values 0000 and 0001 are 0 V and 0.0625 V respectively. The analog value (in Volts) corresponding to the digital signal 1111 is
1. 0.135
2. 0.975
3. 0.9375
4. 0.95

72. The full-scale deflection current of an ammeter is 1 mA and its internal resistance is 100 Ohm. This is to have full deflection when 100V is measured. What is the value of series resistor to be used?
1. 99.99 K ohms
2. 100 K ohms
3. 99.99 ohms
4. 100 ohms

73. Dead zone of an instrument is:
1. The time required by an instrument to warm up initially
2. The largest change of input quantity for which there is no output of the instrument
3. The time required by an instrument to begin to respond to a change in measurand
4. The unmeasured quantity which exceeds the maximum range of the instrument

74. A 12 bit counter type A/D converter uses a 1 MHz clock. If the full scale output is +10V, its resolution output is
1. 2.44mV
2. 2.4mV
3. 0.02V
4. 0.02mV

75. Number of the times the instruction sequence below will loop before coming out of loop is

```
    MOV AL, 00h
A1: INC AL
    JNZ A1
```

1. 00
2. 01
3. 255
4. 256

76. In 8086 the overflow flag is set when
1. The sum is more than 16 bits
2. Signed numbers go out of their range after an arithmetic operation
3. Carry and sign flags are set
4. During subtraction

77. Which microprocessor pins are used to request and acknowledge a DMA transfer?
1. reset and ready
2. ready and wait
3. HOLD and HLDA
4. None of the above

78. Gilbert is a unit of
1. electromotive force
2. magnetomotive force
3. conductance
4. permittivity

79. Two coils have inductances of 8 mH and 18 mH and a co-efficient of coupling of 0.5. If the two coils are connected in series aiding, the total inductance will be
1. 32 mH
2. 38 mH
3. 40 mH
4. 48 mH

80. The electric field intensity at a point situated 4 m from a point charge is 200 N/C. If the distance is reduced to 2 m, the field intensity will be
1. 400 N/C
2. 600 N/C
3. 800 N/C
4. 1200 N/C

81. In lens antenna, what kind of wave energy is transformed into plane waves?
1. Convergent
2. Divergent
3. Contingent
4. Congruent

82. Which auxiliary functions assist in solving the radiation problem by evaluation of E&H using sources J&M?

1. Scalar potentials
2. Vector potentials
3. Gradient potentials
4. Divergence potentials

83. If the diameter of the parabolic reflector of a microwave antenna is doubled, its gain will increase by ————

1. 0 dB
2. 3 dB
3. 6 dB
4. 10 dB

84. The coaxial cable belongs to ———— class of transmission lines

1. TEM
2. Quasi TEM
3. TE
4. TM

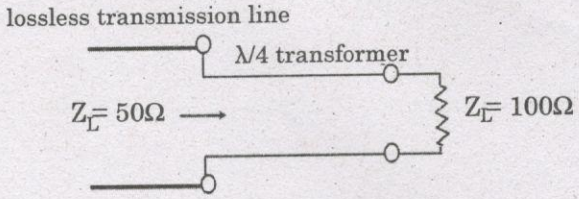
85. Impedance inversion can be obtained with a/an ————

1. Quarter wave line
2. Short circuited stub
3. Open circuited stub
4. Half wavelength line

86. In a transmission line load mismatch, a VSWR of 2 was observed. If the incident power is 36 watt, the reflected power would be

1. 4 W
2. 2 W
3. 5 W
4. 3 W

87. To maximize power transfer, a lossless transmission line is to be matched to a resistive load impedance via a $\lambda/4$ transformer as shown.



The characteristic impedance (in Ω) of the $\lambda/4$ transformer is

1. 7.07
2. 75
3. 70.7
4. 100

88. The dominant modes in rectangular waveguide is ————

1. TE_{10}
2. TM_{01}
3. TE_{11}
4. TM_{11}

89. For a lossless rectangular waveguide, the operating wavelength is 0.6 times cut off wavelength for the operating mode that is transverse magnetic in nature. The wave impedance in the waveguide is ————

1. $150\pi\Omega$
2. $120\pi\Omega$
3. $96\pi\Omega$
4. $50\pi\Omega$

90. When the free space wavelength equals the cut off wavelength,

1. Group velocity equals phase velocity
2. Group velocity becomes infinite
3. Phase velocity becomes zero
4. Group velocity becomes zero

91. Which of the following devices are not being used in microwave power amplifier?
    1. klystron tubes
    2. traveling wave tubes
    3. IMPATT
    4. magnetron

92. A Traveling-Wave Tube (TWT) amplifies by virtue of
    1. The absorption of energy by the signal from an electron stream
    2. The effect of an external magnetic field
    3. The energy contained the cavity resonators
    4. The energy liberated from the collector

93. If the instantaneous RF potentials on the two sides of a magnetron cavity are of opposite polarity, the operation is in the
    1. π mode
    2. $\pi/2$ mode
    3. 2π mode
    4. $\pi/4$ mode

94. Three amplifiers $\{A_1, A_2, A_3\}$ have gains of {5, 10, 3} dB respectively. Their respective Noise levels are {3, 4, 5} dB. The amplifier selected for the first stage amplification of the receiver will be,
    1. A_1
    2. A_2
    3. A_3
    4. Cannot be determined

95. An alternate name for an FM demodulator is
    1. discriminator
    2. encoder
    3. multiplexer
    4. modulator

96. Adaptive Delta Modulation is a technique used for the following:
    1. overcoming impulse noise
    2. protecting small signals from quantizing distortion
    3. overcoming slope overload
    4. none of the above

97. A convenient technique for determining the effects of the degradations introduced into the pulses as they travel to the regenerator is by using
    1. Standing wave ratio
    2. Eye patterns
    3. Reflection coefficient
    4. Any of these

98. An error control coding scheme is shown to achieve a coding gain of 3 dB for a BER of 10^{-6} with the SNR at the receiver input of 14 dB. The SNR that would be needed at the receiver input without the coding scheme would be,
    1. 11 dB
    2. 14 dB
    3. 17 dB
    4. 20 dB

99. If the symbol duration is 1 μs, and one of the frequencies used in the Minimum Shift Keying modulation scheme is 200 MHz, then the other frequency should be
    1. 200.50 MHz
    2. 201.00 MHz
    3. 250.00 MHz
    4. 400.00 MHz

100. The Selective Repeat ARQ scheme ———— the latency when compared to the Stop and Wait ARQ scheme.

1. increases
2. decreases
3. does not change
4. not applicable

101. The receipt of a data packet in the UDP header is confirmed using

1. ACK number
2. FIN flag
3. Sequence number
4. None of the above

102. Which of the following devices translates hostnames into IP addresses?

1. DNS Server
2. Hub
3. DHCP Server
4. Firewall

103. The use of an PIN 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. In a Fabry Perot Cavity Laser, the spacing between the longitudinal laser modes is dictated by the,

1. Confinement layers
2. Width of the active layer
3. Length of the active layer
4. All of the above

105. If a standard single mode fiber is used for light transmission at 1550 nm with an attenuation coefficient of 0.2 dB/km , the total span loss for a fiber of 100 km length with connectors at the ends having loss of 0.5 dB each and a splice at the center with a loss of 1 dB, would be

1. 2 dB
2. 12 dB
3. 22 dB
4. 52 dB

106. Fourier transform of $x(t) = \text{sgn}(t)$ is

1. $\frac{1}{j\omega}$
2. $\delta(\omega)/j$
3. $\frac{2}{j\omega}$
4. $\delta(-\omega)/j$

107. The ROC of the sequence $x(n) = -a^n u(-n-1)$ is

1. $|z| > |a|$
2. $|z| < |a|$
3. $|z| = 0$ only
4. $|z| = \infty$ only

108. The output of a system i
y(n)={5, 12, 7, 16, 4, 6} with inpu
x(n)={1, 2, 0, 2} where x(n) = 0 for n<
and h(n)={5, x, 3}. The value of x is

1. 2
2. 3
3. 4
4. 5

109. The result of the convolution $x(-t) * \delta(-t - t_0)$ is

1. $x(t + t_0)$
2. $x(t - t_0)$
3. $x(-t + t_0)$
4. $x(-t - t_0)$

110. Bilinear transform maps the left half of the s-plane to the

1. unit circle
2. outside of unit circle
3. inside of unit circle
4. $j\omega$ axis

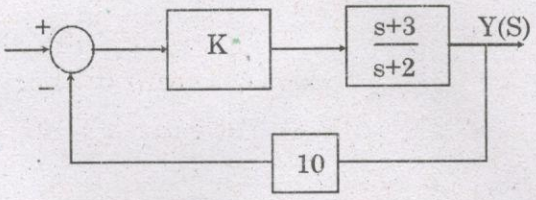
111. The deviation in the frequency response is due to

1. product quantization
2. overflow oscillations
3. coefficient quantization
4. zero-input limit cycles

112. The number of delay elements required in Direct Form II implementation of $H(z) = (1 - z^{-1})/(1 - 0.5z^{-1} + 0.76z^{-2} - 0.63z^{-3})$ is

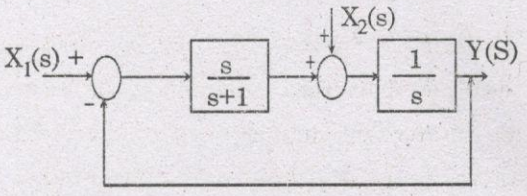
1. 4
2. 3
3. 2
4. 1

113. For the system shown in figure, s = – 2.75 lies on the root locus if K is



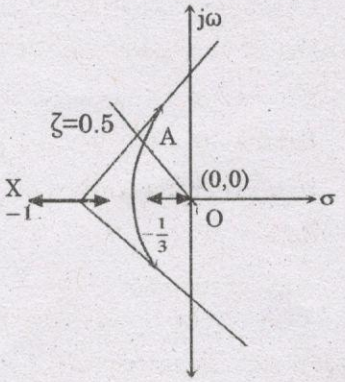
1. 0.2
2. 0.4
3. 0.1
4. 0.3

114. For the following system



1. $\frac{s+1}{s^2}$
2. $\frac{1}{s+1}$
3. $\frac{s+2}{s(s+1)}$
4. $\frac{s+1}{s(s+2)}$

115. The characteristic equation of a unity negative feedback system 1+KG(s) = 0. The open loop transfer function G(s) has one pole at 0 and two poles at -1. The root locus of the system for varying K is shown in the figure. The constant damping ratio line, for $\zeta = 0.5$, intersects the root locus at point A. The distance from the origin to point A is given as 0.5. The value of K at point A is



1. 0.325
2. 0.375
3. 0.475
4. 0.250