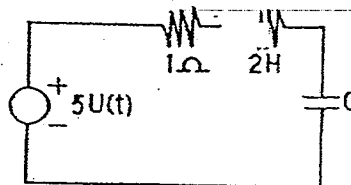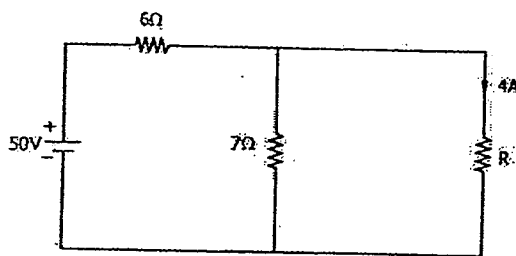1   The value of C which gives the critical damping in the given circuit is

   a) 2F
   b) 4F
   c) 8F
   d) 1F

2   A series RLC circuit resonates at 3 MHz and has 3-dB bandwidth of 10 kHz. The Q of the circuit at resonance

   a) 30
   b) $\dfrac{300}{\sqrt{2}}$
   c) 300
   d) $300\sqrt{2}$

3   The value of resistance R shown in the given figure is

   a) 3.5 Ω
   b) 2.5 Ω
   c) 1 Ω
   d) 4.5 Ω

4   At 3-dB frequencies, current in the series RLC circuit equal current at resonance multiplied by

   a) $\dfrac{1}{2}$
   b) $\dfrac{1}{\sqrt{2}}$
   c) $\dfrac{1}{4}$
   d) $\dfrac{1}{2\sqrt{2}}$

5   A series RLC circuit resonates at 1000 kHz. At frequency of 995 kHz, the circuit impedance is

   a) Resistive
   b) minimum
   c) Inductive
   d) capacitive

6   If each stage had gain of 10dB and noise figure of 10dB, then the overall noise figure of two-stage cascade amplifier will be

   a) 10
   b) 1.09
   c) 1.0
   d) 10.9

7   In Sigma delta ADC, high bit accuracy is achieved by

   a) Over sampling and noise shaping
   b) Over sampling
   c) Under sampling
   d) None of the above

8   Let s(t) denote the delta function. The value of the integral

$$\int_{-\alpha}^{\alpha} \delta(t)\cos\left(\frac{3t}{2}\right)dt \text{ is}$$

   a) 1
   b) -1
   c) 0
   d) $\pi/2$

9 Consider the compound system shown in the above figure. Its output is equal to the input with a delay of two units. If the transfer function of the first system is given by $H_1(Z) = \dfrac{Z - 0.5}{Z - 0.8}$, then the
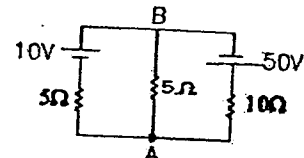
Input → H₁(Z) → H₂(Z) → Output
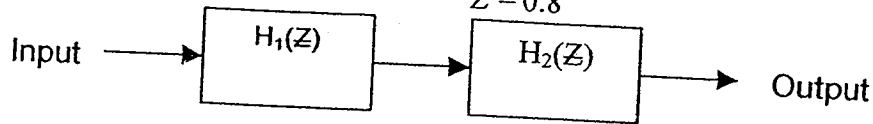
a) $H_2(Z) = \dfrac{Z^{-2} - 0.2Z^{-3}}{1 - 0.4Z^{-1}}$

b) $H_2(Z) = \dfrac{Z^{-2} - 0.8Z^{-3}}{1 - 0.5Z^{-1}}$

c) $H_2(Z) = \dfrac{Z^{-1} - 0.2Z^{-3}}{1 - 0.4Z^{-1}}$

d) $H_2(Z) = \dfrac{Z^{-2} - 0.8Z^{-3}}{1 - 0.5Z^{-1}}$

10 The z – transform of the signal

$$x(n) = \begin{cases} 1, n = -1 \\ 2, n = 0 \\ -1, n = 1 \\ 1, n = 2 \\ 0, otherwise \end{cases}$$
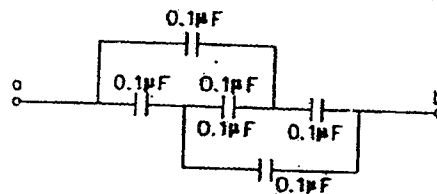
a) $z + 2 - z^{-1} + z^{-2}$

b) $z^{-1} + 2 - z + z^{2}$

c) $z + 2z^{2} - z^{-1} + z^{-2}$

d) $z + 2 - z^{+1} + z^{-2}$

11 For the circuit shown in the given figure, the voltage V_{AB} is

a) 6V

b) 10 V

c) 25 V

d) 40 V

12 The equivalent capacitance across 'ab' will be

a) 0.2μF

b) 0.1μF

c) 0.5μF

d) 0

13 The transfer function, $T(s) = \dfrac{s}{s + a}$ is that of a

a) Low-pass filter

b) Notch filter

c) High-pass filter

d) Band-pass filter

14 A particular current is made up of two components: a 10 A dc and a sinusoidal current of peak value of 1.414 A. The average value of the resultant current is

a) Zero   b) 24.14 A   c) 10 A   d) 14.14 A

15 By doubling the sampling frequency
   a)   Quantisation noise decreases by 3dB
   b)   Quantisation noise density decreases by 3dB
   c)   Quantisation noise increases by 3dB
   d)   Quantisation noise density increases by 3dB

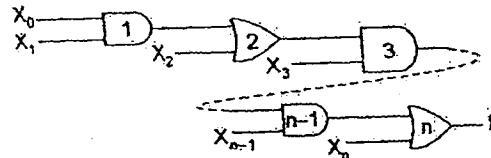16 The output voltage (v_0) of the circuit shown in the given figure is
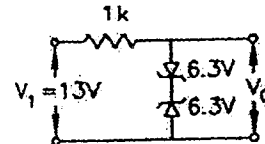
a) Zero   b) 5.7 V   c) 6.9 V   d) 12.6 V

17 Assuming that only the X and Y logic inputs are available and their complements $\overline{X}$ and $\overline{Y}$ are not available, what is the minimum number of two-input NAND gates requires to implement $X \oplus Y$?

a) 2   b) 3   c) 4   d) 5

18 In the given network of AND and OR gates f can be written as:

   a) $X_0 X_1 X_2 \ldots\ldots X_n + X_1 X_2 \ldots\ldots X_n + X_2 X_3 \ldots\ldots X_n \ldots\ldots X_n$
   b) $X_0 X_1 + X_2 + X_3 + \ldots\ldots + X_{n-1} \cdot X_n$
   c) $X_0 + X_1 + X_2 + \ldots\ldots X_n$
   d) $X_0 X_1 X_3 \ldots\ldots X_{n-1} + X_2 + X_3 + X_5 \ldots\ldots X_{n-1} + \ldots\ldots + X_{n-2} + X_{n-1} + X_n$

19 A Pulse train with a frequency of 1MHz is counted using a modulo 1024 ripple-counter built with J-K flip-flops. For proper operation of the counter the maximum permissible propagation delay per flip-flop stage is

a) 100 n sec   b) 50 n sec   c) 20 n sec   d) 10 n sec

20 The A/D converter used in a digital voltmeter could be (1) successive approximation type (2) Flash converter type (3) Dual slope converter type. The correct sequence in the increasing order of their conversion times is

a) 1,2,3   b) 2,1,3   c) 3,2,1   d) 3,1,2

21 The resolution of a D/A converter is approximately 0.4% of its full-scale range. It is
a) An 8-bit converter
c) A 12 bit converter
b) A 10-bit converter
d) A 16 bit converter

22 In a microprocessor, the resister which holds the address of the next instruction to be fetched is
a) Accumulator
c) Stack pointer
b) Program counter
d) Instructor register

23 In microcomputer, WAIT states are used to
a)   Make the processor wait during a DMA operation
b)   Make the processor wait during a power interrupt processing
c)   Make the processor wait during a power shutdown
d)   Interface slow peripherals to the processor

24 Which of the following statements are correct
1. A flip-flop is used to store 1 bit of information
2. Race-around condition occurs in a J-K flip-flop when both the inputs are 1
3. Master-slave configuration is used in flip-flops to store 2 bits of information
4. A transparent latch consists of a D-type flip-flop
a) 1,2 and 3   b) 1,3 and 4   c) 1,2 and 4   d) 2,3 and 4

25 How many 1 's are present in the binary representation of $3\times512+7\times64+5\times8+3$?
a) 8   b) 9   c) 10   d) 11

26 For emitter-coupled logic, the switching speed is very high because
a)   Negative logic, is used
b)   The transistors are not saturated when conducting
c)   Emitter-coupled transistors are used
d)   Multi-emitter transistors are used

27 The out put of the circuit shown below is

a) A pulse train of duration 0.5 sec.
c) A pulse train of duration 1 sec.
b) A pulse train of duration 2 sec.
d) A pulse train of duration 5 sec.

28 Gray code for number 7 is
a) 1100   b) 1001   c) 0110   d) 0100

29 10 bit A/D converters, the quantization error is given by (in percent)
a) 1   b) 2   c) 0.1   d) 0.2

30 For the switch circuit, taking open as 0 and closed as 1, the expression for the circuit is Y.
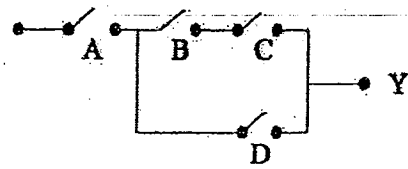
a) A+ (B+C) D

b) A + BC+ D

c) A (BC+D)

d) None of these

31 The Boolean expression for the shaded area in the Venn diagram is
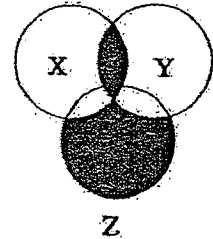
a) $\bar{x}+\bar{Y}+Z$

b) $X\bar{Y}Z+\overline{XYZ}$

c) $X+Y+Z$

d) $\overline{XYZ}+XY$

32 If the memory chip size is 256*1 bits, then the number of chips required to make up 1K bytes of memory is

a) 32

b) 24

c) 12

d) 8

33 Given the decimal number – 19, an eight bit two's complement representation is given by

a) 11101110

b) 11101101

c) 11101100

d) None of these

34 The function shown in the figure when simplified will yield a result with

a) 2 terms

b) 4 terms

c) 7 terms

d) 16 terms

35 The logic circuit given below converts a binary code $Y_1Y_2Y_3$ into
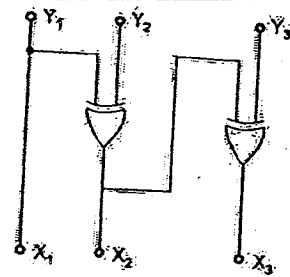
a) Excess -3 code
c) BCD code

b) Gray code
d) Hamming code

36 A 4-bit synchronous counter uses flip-flops with propagation delay time of 25 ns each. The maximum possible time required for change of state will be

a) 25 ns   b) 50 ns   c) 75 ns   d) 100 ns

37 An electromagnetic wave incident on a perfect conductor is :

a) Entirely reflected
c) Partially transmitted

b) Fully transmitted
d) None of these

38 The characteristic impedance of a lossless transmission line is given by

a) $Z = \sqrt{LC}$ b) $Z = \sqrt{C/L}$ c) $Z = LC$ d) $Z = \sqrt{L/C}$

39 A lossless line of 50 ohms is terminated in a load of 100 ohms resistive. The VSWR is

a) 1:2   b) 2:1   c) 4:1   d) 1:4

40 Which of the following does not exist in waveguides

a) TE waves
c) TE waves and TM waves

b) TM waves
d) TEM waves

41 Two carriers of 2GHz and 4GHz respectively are frequency modulated by a signal of 10KHz, such that bandwidth of the FM signal in the two cases are same. The peak deviation in the two cases are in the ratio of

a) 1:8   b) 1:2   c) 2:1   d) 1:1

42 The bandwidth required for QPSK modulated channel is

a) Twice the BW of BPSK
c) Equal to FSK

b) Equal to BPSK
d) Half of the BW of BPSK

43 Magic T is

a) Four part junction
c) Three part junction

b) Two part junction
d) It is not junction

44 Diplexer is made of
a) Only receive filter
b) Only transmit filter
c) Only circulator
d) Both receive filter and transmit filter

45 The gain G of an antenna of effective area A is given by
a) $G = \dfrac{4\pi\lambda}{A^2}$
b) $G = \dfrac{4\pi A}{\lambda}$
c) $G = \dfrac{4\pi A}{\lambda^2}$
d) None

46 If the short circuit and open circuit impedance of a line are 5 and 20Ω respectively the characteristic impedance is given by
a) $100\,\Omega$
b) $10\,\Omega$
c) $15\,\Omega$
d) $10000\,\Omega$

47 The input impedance of short circuited line of length l where $\lambda/4 < l < \lambda/2$, is
a) Capacitive
b) Inductive
c) Resistive
d) None of these

48 Maximum coding gain in
a) Block Codes
b) Convolution Codes
c) Turbo Codes
d) RS Codes

49 Noise figure of an amplifier depends on
a) Bandwidth
b) Output power
c) Power input
d) None of the above

50 BCH code belongs to
a) Block Codes
b) Convolution Codes
c) Turbo Codes
d) None of the above

51 When a carrier is phase modulated, with an integrated modulating signal, the resultant is
a) Phase modulated signal
b) Frequency modulated signal
c) Amplitude modulated signal
d) QPSK modulated signal

52 A satellite orbiting in 600 km orbit transmits 5 GHz frequency. The Doppler shift observed at the ground station, when the satellite is over head of the station is
a) Zero
b) Maximum
c) Infinity
d) None of the above

53 A communication channel disturbed by additive white Gaussian noise has a bandwidth of 4kHz and SNR of 15. The highest transmission rate that such a channel can support (in k-bits/sec) is
a) 16
b) 1.6
c) 3.2
d) 60

54 A dual directional coupler is connected in a microwave reflectometer measurement setup. The reading of the power meter in the forward direction is 100 mw and in the reverse direction 4 mw. The VSWR is
a) 4   b) 0.4   c) 1.5   d) 10

55 Linear amplifier with a gain of 30dB is fed with $1.0\mu W$ power, the output power of the amplifier
a) 1.0 W   b) 0 dBm   c) 30dBm   d) -30dBm

56 10Watts RF power is transmitted with a circular polarized antenna having gain of 10dB. A receiving antenna has vertical polarization. The path loss is 100dB. The receiving signal is
a) -83dBW   b) -80dBW   c) -86dBW   d) +80dBW

57 $\vec{p} = 2i - 3j, \vec{Q} = -3i + 4j - 2k$, and $\vec{R}$ are in equilibrium, if $\vec{R}$ is
a) $-i - j + 2k$ b) $i - j + 2k$ c) $i + j + 2k$ d) $i - j - 2k$

58 A rigid body is rotating with constant angular velocity ω about a fixed axis, if v is the velocity of a point of the body, then curl $v =$
a) ω b) ω^2 c) 2ω d) $2\omega^2$

59 Laplace transform of $\sin^3 2t$ is
a) $\dfrac{24}{\left(s^2 + 4\right)\left(s^2 + 36\right)}$

b) $\dfrac{1}{\left(s^2 + 4\right)\left(s^2 + 64\right)}$

c) $\dfrac{48}{\left(s^2 + 4\right)\left(s^2 + 36\right)}$

d) $\dfrac{64}{\left(s^2 + 4\right)\left(s^2 + 36\right)}$

60 The value of the determinant $\begin{vmatrix} \cos\theta & 0 & \sin\theta \\ 0 & 1 & 0 \\ -\sin\theta & 0 & \cos\theta \end{vmatrix}$ is

a) 0   b) -1   c) 1   d) 2

61 Solution of $\left(D^2 + 4\right)y = \sin^2 x$, is

a) $y = A\cos 2x + B\sin 2x - \dfrac{1}{8} - \dfrac{x}{8}\sin 2x$

b) $y = A\cos 2x + B\sin 2x + \dfrac{1}{8} + \dfrac{x}{8}\sin 2x$

c) $y = A\cos 2x + B\sin 2x - \dfrac{1}{8} + \dfrac{x}{8}\sin 2x$

d) $y = A\cos 2x + B\sin 2x + \dfrac{1}{8} - \dfrac{x}{8}\sin 2x$

62 The value of k for which the lines $2x + y - 1 = 0, 4x + 3y - 3 = 0$ and $3x + ky - 2 = 0$, are concurrent is
a) -2   b) 3   c) 2   d) -3

63 A box contains 5 black and 5 red balls. Two balls are randomly picked one after another from the box, without replacement. The probability for both balls being red is

a) $\dfrac{1}{90}$ b) $\dfrac{1}{5}$ c) $\dfrac{19}{90}$ d) $\dfrac{2}{9}$

64 $x^3 + x\sin x$ is
 a) Constant function
 c) Even function
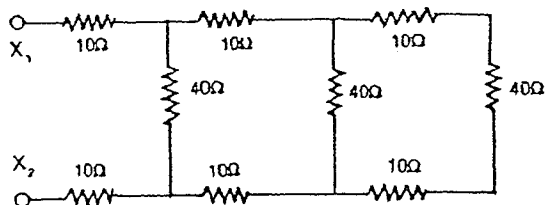 b) Odd function
 d) Periodic function

65 $\int \dfrac{dx}{x\sqrt{x^2 - a^2}}$ is

a) $\dfrac{1}{a}\cos ec^{-1}\left(\dfrac{x}{a}\right)$

b) $\dfrac{1}{a}\sin^{-1}\left(\dfrac{x}{a}\right)$

c) $\dfrac{1}{a}\cos^{-1}\left(\dfrac{x}{a}\right)$

d) $\dfrac{1}{a}\sec^{-1}\left(\dfrac{x}{a}\right)$

66 Eigen values of $\begin{bmatrix} -5 & 2 \\ 2 & -2 \end{bmatrix}$ are

a) -6, -1   b) 6, -1   c) -6,1   d) 6,1

67 The approximate equivalent resistance at the points X_1 and X_2 in the circuit shown below

a) 60 Ω   b) 40Ω   c) 80Ω   d) 20Ω

68 An inductor supplied with 50 V ac with a frequency of 10 kHz passes a current of 7.96 mA. The value of inductor is
a) 1mH   b) 10mH   c) 100mH   d) 1H

69 In a capacitor, the electric charge is stored in
a) Dielectric
c) Dielectric as well as metal plates
b) Metal plates
d) Neither dielectric nor metal plates

70 Oscillator requires
a) No feedback
c) Positive feedback
b) Negative feedback
d) Either positive or negative feedback

71 Which loss in a transformer varies significantly with load?
a) Hysteresis loss
c) Copper loss
b) Eddy current loss
d) Core loss

72 The resistance of a parallel circuit consisting of two resistors is 12 Ω. One of the resistance wires breaks and the effective resistance becomes 18Ω. The resistance of the broken wire is

a) 48 Ω　　　b) 18 Ω　　　c) 36 Ω　　　d) 24 Ω.

73 Time constant of a series R-L circuit equals

a) L/R second　　b) LR second　　c) L^2R　　d) LR^2

74 A dc voltage V is applied at time t=0 to a series RC circuit. The steady state current is

a) $\dfrac{V}{R}$　　b) $\dfrac{V}{C}$　　c) $\dfrac{V}{\sqrt{R^2+C^2}}$　　d) Zero
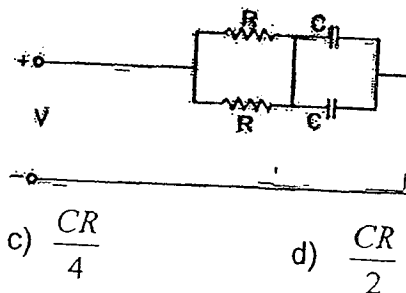
75 The given circuit represents a
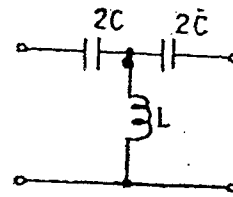
a) Low pass filter　b) High pass filter　c) Band pass filter　d) Band stop filter

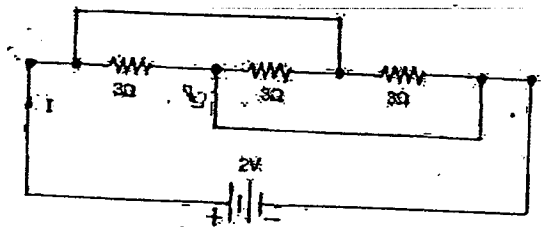76 The very low frequency gain of the low pass filter shown in the given figure is
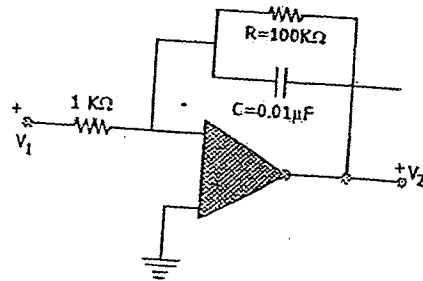
a) 10 dB　　b) 20 dB　　c) 30 dB　　d) 40 dB

77 The time-constant of the network shown in the figure is

a) CR　　b) 2 CR　　c) $\dfrac{CR}{4}$　　d) $\dfrac{CR}{2}$

78 For the circuit shown below the current I flowing through the circuit will be

a) ½ A   b) 1 A   c) 2A   d) 4A

79 When L is doubled and C is halved, the resonance frequency of series tuned circuit becomes

a) Doubled   b) Halved   c) One quarter   d) Unchanged

80 In a Series resonant circuit, with the increase in L

a)   Resonant frequency will decrease
b)   Bandwidth will decrease
c)   Q will increase
d)   All of these