56. The admittance parameter Y_{12} in the 2-port network in figure is
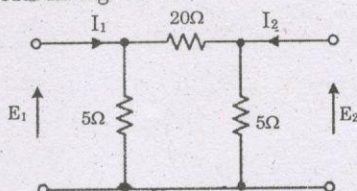
1. −0.2 mho
2. 0.1 mho
3. −0.05 mho
4. 0.05 mho

57. In the following figure, C_1 and C_2 are ideal capacitors. C_1 has been charged to 12V before the ideal switch S is closed at t=0. The current i(t) for all t is
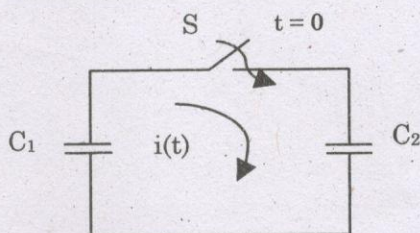
1. Zero
2. A step function
3. An exponentially decaying function
4. An impulse function

58. The two-port network P shown in the figure has ports 1 and 2, denoted by terminals (a,b) and (c,d), respectively. It has an impedance matrix Z with parameters denoted by Z_{ij}. A 1Ω resistor is connected in series with the network at port 1 as shown in the figure. The impedance matrix of the modified two-port network (shown as a dashed box) is
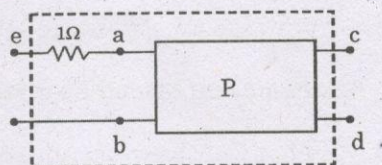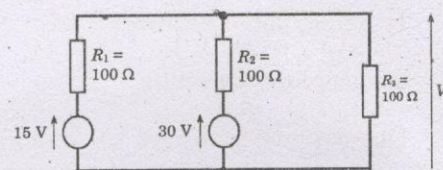

1. $\begin{bmatrix} Z_{11}+1 & Z_{12}+1 \\ Z_{21} & Z_{22}+1 \end{bmatrix}$

2. $\begin{bmatrix} Z_{11}+1 & Z_{12} \\ Z_{21} & Z_{22}+1 \end{bmatrix}$

3. $\begin{bmatrix} Z_{11}+1 & Z_{12} \\ Z_{21}+1 & Z_{22} \end{bmatrix}$

4. $\begin{bmatrix} Z_{11}+1 & Z_{12} \\ Z_{21} & Z_{22} \end{bmatrix}$

59. How much current will flow in a series RL circuit when $V_T = 200\,\text{V}$, $X_L = 160\,\Omega$ $X_C = 80\,\Omega$ and $R = 60\,\Omega$?

1. 2 A
2. 1 mA
3. 6.28 A
4. 10 A

60. Using superposition theorem, determine the output voltage V of the following circuit

1. 30 V
2. 15 V
3. 45 V
4. 7.5 V

61. $x(t) = e^t$ is a signal that has

1. infinite power and energy
2. finite energy and power
3. finite energy and zero power
4. infinite energy and zero power

62. For the signal $e^{j\omega o^n}$ to be periodic with period N, the condition to be satisfied is (assume is an integer) :

1. $\omega_o = 2\pi m / N$
2. $2\pi\,\omega_0 / N = m$
3. $2\pi / N\omega_o = m$
4. $\omega_o = 2\pi N / m$

63. $x(n)$ is called an odd signal if

1. $x(n) = (2n+1)x(n)$
2. $x(n) = -x(-n)$
3. $x(n) = -x(n)$
4. $x(n) = x(-n)$

64. The system $y(t) = \sin(t)x(t)$ is

1. Time invariant and stable
2. Time invariant and unstable
3. Time variant and stable
4. Time variant and unstable

65. In linear convolution, the equation $x(n) * \{h_1(n) + h_2(n)\} = \{x(n) * h_1(n)\} + \{x(n) * h_2(n)\}$ is
    1. Associative property
    2. Distributive property
    3. Additive property
    4. Linearity property

66. A transistor has current gain of 0.99 in CB mode. Its current gain in CC mode is
    1. 99
    2. 1.01
    3. 0.99
    4. 100

67. Reverse recovery is nearly zero in
    1. Tunnel diode
    2. Varactor diode
    3. Schottky diode
    4. PIN diode

68. Assertion (A) : The conductivity of p-type semiconductor is higher than that of intrinsic semiconductor.

    Reason (R) : The addition of donor impurity to an intrinsic semiconductor creates additional energy levels below conduction band.

    Choose the best statement.
    1. Both (A) and (R) are True and (R) is the correct explanation of (A)
    2. Both (A) and (R) are True but (R) is not the correct explanation of (A)
    3. (A) is True but (R) is False
    4. (A) is False but (R) is True

69. An amplifier without feedback has a voltage gain of 50, input resistance of 1K and output resistance of 2.5 K. If the amplifier is provided current shunt feedback with a feedback factor of 0.2, the input resistance of the feedback amplifier would be :
    1. 1/11 K
    2. 1/5 K
    3. 11 K
    4. 5 K

70. BJT has ——————— input impedance and MOSFET has ——————— input impedance.
    1. Low and low
    2. Low and high
    3. High and low
    4. High and high

71. For the given $F = \sum X, Y, Z \ (1,2,5,7)$, find the minimum sum of Products expression
    1. $\overline{X}Y\overline{Z} + \overline{Y}Z$
    2. $X\overline{Z} + \overline{Y}$
    3. $XYZ + XZ + \overline{Y}Z$
    4. $\overline{X}Y\overline{Z} + XZ + \overline{Y}Z$

72. How many flip-flops are required to produce a divide-by-128 device?
    1. 2
    2. 4
    3. 6
    4. 7

73. MOS family that dominates VLSI field is
    1. PMQS
    2. NMOS
    3. CMOS
    4. None of above

74. The resolution of a 4-bit ADC is 0.5 Volts. For an analog input of 6.7 volts, the digital output of the ADC will be
    1. 1011
    2. 1101
    3. 1111
    4. 1000

75. The following program starts at location 4100H
    4100 LXI SP, 0010
    4103 LXI H, 4107
    4106 MVI A, 40H
    4108 SUB M
    4109
    The content of accumulator when the Program counter reaches 4109H will be
    1. 20H
    2. 00H
    3. 02H
    4. FFH

76. For a Gaussian distribution, the probable error is r. This means that
    1. Area under the curve between ±r limits is 0.5
    2. Half of the observed values lie between ±r limits
    3. Chances that an additional observation will lie between ±r limits are 50%
    4. All of the above

77. The high torque to weight ratio in an analog indicating instrument indicates
    1. High friction loss
    2. Low friction loss
    3. Not related to friction loss
   4. None of the above

78. An electrodynamometer type of instruments finds its major use as
1. Standard instrument only
2. Transfer instrument only
3. Both as standard and transfer instrument
4. A indicator type of instrument

79. The power in a 3 phase four wire circuit can be measured by using
1. 2 watt meters
2. 4 watt meters
3. 3 watt meters
4. 1 watt meter

80. Maxwell's inductance-capacitance bridge is used for measurement of inductance of
1. Low Q coils
2. Medium Q coils
3. High Q coils
4. Low and medium Q coils

81. The bandwidth of a CRO is from 0–20 MHz. The fastest rise time, a sine wave can have to be accurately reproduced by the instrument is
1. 35 ns
2. 35 µs
3. 17.5 ns
4. 0.175 µs

82. The lower limit of useful working range of a transducer is determined by
1. Minimum useful input level
2. By transducer error and noise
3. Cross sensitivity
4. Dynamic response

83. A digital voltmeter uses an A/D converter which needs a start pulse, uses an analog comparator and has a relatively fixed conversion time independent of the applied voltage. The A/D converter is
1. Successive approximation converter
2. Digital ramp converter
3. Dual slope converter
4. All of the above

84. Determine the flow velocity of water of density 1000 kg/m³ at the head of the pitot tube if it produces a pressure difference of 10 KPa between the outlets
1. 7.47 m/s
2. 5.47 m/s
3. 6.47 m/s
4. 4.47 m/s

85. The excitation frequency of LVDT is 2 kHz. The maximum frequency of displacement should be limited to
1. 1.5 kHz
2. 200 Hz
3. 1.0 kHz
4. 4.0 kHz

86. Square root extractor is needed for
1. Electromagnetic flow meter
2. Ultrasonic flow meter
3. Differential head type flow meter
4. Variable are type flow meter

87. When a weir is placed in an open channel, which of these factors is used to determine fluid flow rate?
1. Level
2. Weight
3. Pressure
4. Density

88. Standard resistor is made from
1. platinum
2. manganin
3. silver
4. nichrome

89. Which transducer is best suited for measuring rapidly changing input?
1. second order transducer with large natural frequency
2. second order transducer with small rise time
3. first order transducer with small time constant
4. zero order transducer

90. In an LVDT the harmonics in supply and stray capacitance between primary and secondary causes
1. Phase shift between input voltage and output voltage
2. A non-zero core null position voltage
3. Increase in static sensitivity
4. Decrease in linear range

91. In variable head type of flow meters a large coefficient of discharge means
1. Pressure loss is less and sensitivity of the meter is less
2. Pressure loss is less and sensitivity of the meter is high
3. Pressure loss is high and sensitivity of the meter is less
4. Pressure loss is high and sensitivity of the meter is high

92. _____ will determine the maximum allowable current in thermistor.
 1. Length of the lead wires
 2. Dissipation constant
 3. Surrounding medium
 4. All of the above

93. The factors that affect the operating range of mercury thermometer is
 1. Bulb size
 2. Coefficient of expansion of Mercury
 3. Coefficient of expansion of bulb material
 4. All of the above

94. The Detector used in IR spectroscopy is
 1. PMT
 2. Electron capture detector
 3. Thermal detectors
 4. Photocell

95. The sample port in a chromatography is to be maintained _____ above the Boiling point of the least volatile component of the sample.
 1. $30°C$
 2. $40°C$
 3. $50°C$
 4. Not a criteria

96. Which of the following analyzer is not suitable for multi component analysis?
 1. Spectroscopy
 2. Chromatography
 3. Mass Spectroscopy
 4. Ion selective electrodes

97. When the reading of a pH meter changes from 5 to 7 the hydrogen ion concentration of the solution is
 1. Halved
 2. Doubled
 3. Increased 100 times
 4. Decreased 100 times

98. Electrical conductivity of Electrolytes _____ and metals _____ with increase in temperature.
 1. increases and increases
 2. increases, decreases
 3. decreases, increases
 4. decreases, decreases

99. Which of the following is an indirect way of FM generation?
 1. Reactance bipolar transistor modulator
 2. Armstrong modulator
 3. Varactor diode modulator
 4. Reactance FM modulator

100. A carrier is simultaneously amplitude modulated by two sine waves having modulation indices of 0.4 and 0.3. The total modulation index will be
 1. 0.1
 2. 0.7
 3. 0.5
 4. 0.35

101. Consider the following statements
 (i) The amplitude of an FM wave is constant.
 (ii) FM is more immune to noise than AM.
 (iii) FM broadcasts operate in upper VHF and UHF frequency ranges.
 (iv) FM transmitting and receiving equipment are simpler as compared to AM transmitting and receiving equipment.

 Choose the best statement among the following.
 1. All are correct
 2. (iv) alone is wrong
 3. (i) alone is wrong
 4. (ii) alone is wrong

102. Light is confined within the core of a single optical fiber by
 1. Total internal reflection within the core
 2. Total internal reflection between core cladding boundary
 3. Total internal reflection within the cladding
 4. Total internal reflection between cladding and outer sheath

103. In multimode graded index fiber, light rays travel _____ in different parts of fiber.
 1. At different speeds
 2. At same speed
 3. Same speed at the beginning and then at different speeds
 4. Different speed initially and then at same speed

104. Closed-loop transfer function of a unity-feedback system is given by $\frac{y(s)}{r(s)} = \frac{1}{\tau s + 1}$.

 Steady-state error to unit-ramp input is
 1. ∞
 2. τ
 3. 1
 4. $1/\tau$

105. Assuming zero initial condition, the response y(t) of the system given below to a unit step input u(t) is

U(s) → [$\frac{1}{s}$] → Y(s)
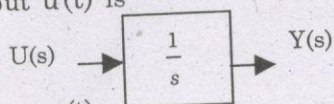
1. u(t)

2. t u(t)

3. $t^2 u(t)$

4. $e^{-t} u(t)$

106. The forward path transfer function of unity feedback control is $G(s) = \dfrac{1000}{(1+0.1s)(1+10s)}$ the step, ramp and parabolic error constants are

1. 0,1000,0

2. 1000,0,0

3. 0,0,0

4. 0,0,1000

107. The number of roots of the equation $(2s^4 + s^3 + 3s^2 + 5s + 7) = 0$ that lie in the right half of s plane is

1. Zero

2. One

3. Two

4. Three

108. If the controller output changes by 100% for 20% change in control variable the Kp is

1. Zero

2. Unity

3. 5

4. 10

109. Larger differential gap in on-off controller leads to

1. increase in frequency of operation of control valve

2. decrease in frequency of operation of control valve

3. no change in frequency of operation of control valve

4. control valve opens to 100%

110. Feed forward control is added with feedback control system when

1. Set point changes frequently

2. Load variable changes frequently

3. Process gain changes frequently

4. The process is nonlinear

111. Identify the controller that exhibits zero order behavior

1. Integral

2. Proportional

3. Derivative

4. PID

112. Identify the timer in which "Output B comes on at a specific set time after output A is turned on. When A is turned off, B also goes off and the accumulated time value is retained even if the input rung is de-energized"

1. ON DELAY timer

2. OFF DELAY timer

3. Retentive ON DELAY timer

4. Non retentive ON DELAY timer

113. To simultaneously optimize an interacting dead-time dominant process with multiple constraints, one should use a(n) :

1. Override PID control

2. Model predictive control

3. Decoupled PID control

4. PID Controller

114. Identify the communication protocol that supports both analog and digital communication

1. ISO/OSI reference model

2. HART

3. Foundation Field Bus

4. MODBUS

115. In a ―――――― control system, the control function is allocated to several microprocessor-based control units. The control units can manipulate one or more process control loops, perform calculations and detect alarm functions. In this system computer has all of the control responsibility

1. DDC

2. Supervisory

3. PLC

4. DCS