

PART III

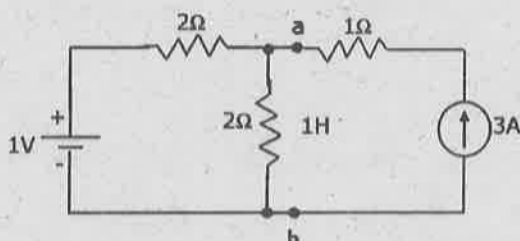
04 - ELECTRONICS AND COMMUNICATION ENGINEERING

(Answer ALL questions)

56. The Nodal method of circuit analysis is based on

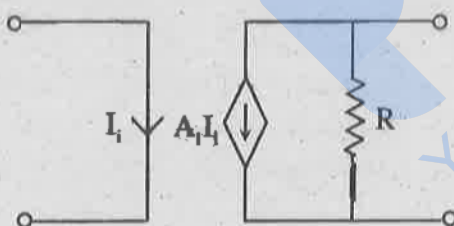
- KVL and Ohm's law
- KCL and Ohm's law
- KCL and KVL
- KCL, KVL and Ohm's law

57. The voltage across the terminals a and b in Fig. is



- 0.5V
- 3.0V
- 3.5V
- 4.0V

58. The circuit shown in the figure represents a

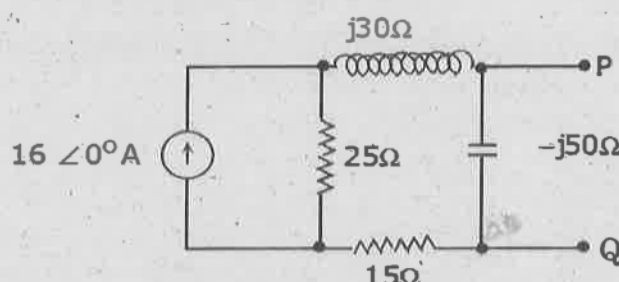


- Voltage controlled voltage source
- Voltage controlled current source
- Current controlled voltage source
- Current controlled current source

59. Superposition theorem is NOT applicable to networks containing

- Nonlinear elements
- Dependent voltage sources
- Dependent current sources
- Transformers

60. In the circuit shown below, the Norton equivalent current in amperes with respect to terminals P and Q is

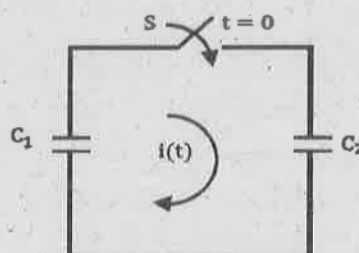


- $6.4 - j4.8$
- $6.56 - j7.87$
- $10 + j0$
- $16 + j0$

61. Norton's theorem states that a complex network connected to a load can be replaced with an equivalent impedance

- In series with a current source
- In parallel with a voltage source
- In series with a voltage source
- In parallel with a current source

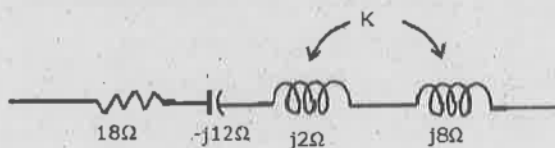
62. In the following figure, C_1 and C_2 are ideal capacitors. C_1 has been charged to 12 V before the ideal switch S is closed at $t = 0$. The current $i(t)$ for all t is.



- zero
- a step function
- an exponentially decaying function
- an impulse function

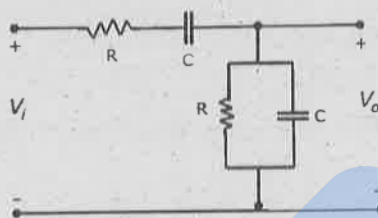
63. A ramp voltage, $v(t) = 100t$ Volts, is applied to an RC differentiating circuit with $R = 5k\Omega$ and $C = 4\mu F$. The maximum output voltage is
- 0.2 volt
 - 2.0 volts
 - 10.0 volts
 - 50.0 volts

64. In the series circuit shown in figure, for series resonance, the value of the coupling coefficient K will be



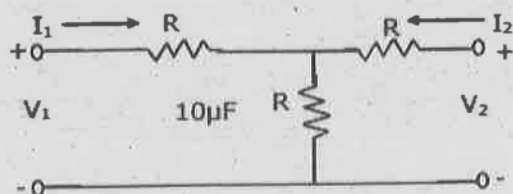
- 0.25
- 0.5
- 0.999
- 1.0

65. The RC circuit shown in the figure is



- a low-pass filter
- a high-pass filter
- a band-pass filter
- a band-reject filter

66. A 2-port network is shown in figure. The parameter h_{21} for this network can be given by



- +1/2
- 1/2
- +3/2
- 3/2

67. A Zener diode works on the principle of
- Tunneling of charge carriers across the junction
 - Thermo ionic emission
 - Diffusion of charge carriers across the junction
 - Accumulation of charge carriers across the junction

68. Which of the following is NOT associated with a P-N junction?

- Junction capacitance
- Charge storage capacitance
- Depletion capacitance
- Channel length modulation

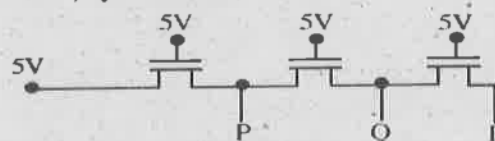
69. The threshold voltage of an n-channel MOSFET can be increased by

- Increasing the channel dopant concentration
- Reducing the channel dopant concentration
- Reducing the gate-oxide thickness
- Reducing the channel length

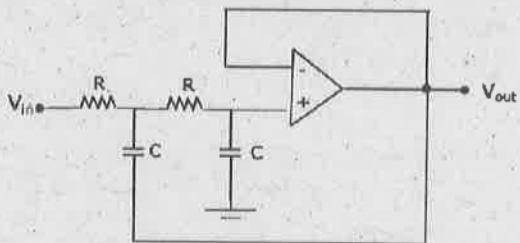
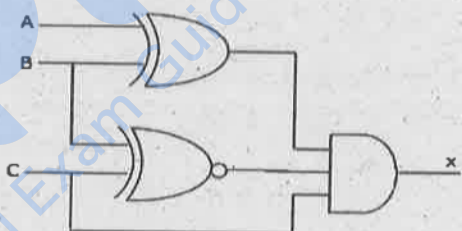
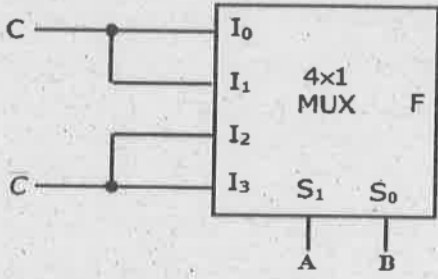
70. A MOS capacitor made using p-type substrate is in the accumulation mode. The dominant charge in the channel is due to the presence of

- Holes
- Electrons
- Positively charged ions
- Negatively charged ions

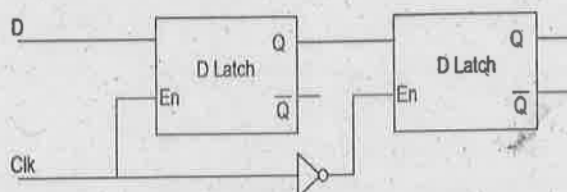
71. In the following circuit employing pass transistor logic, all NMOS transistors are identical with a threshold voltage of 1 V. Ignoring the body-effect, the output voltages at P, Q and R are,



- 4 V, 3 V, 2 V
- 5 V, 5 V, 5 V
- 4 V, 4 V, 4 V
- 5 V, 4 V, 3 V

72. The current gain of a BJT is
 a. $g_m r_0$
 b. g_m / r_0
 c. $g_m r_\pi$
 d. g_m / r_π
73. In a multi-stage RC-Coupled Amplifier the coupling capacitor.
 a. limits the low frequency response
 b. limits the high frequency response
 c. does not effect the frequency response
 d. blocks the d.c components without effecting the frequency response
74. The Miller effect in the context of a Common Emitter amplifier explains
 a. an increase in the low-frequency cutoff frequency
 b. an increase in the high- frequency cutoff frequency
 c. a decrease in low- frequency cutoff frequency
 d. a decrease in high- frequency cutoff frequency
75. In a differential Amplifier, CMRR can be improved by using an increased
 a. Emitter resistance
 b. Collector resistance
 c. Power supply voltage
 d. Source resistance
76. The ideal Op-Amp has the following characteristics.
 a. $R_i = \infty$, $A = \infty$, $R_0 = 0$
 b. $R_i = 0$, $A = \infty$, $R_0 = 0$
 c. $R_i = \infty$, $A = \infty$, $R_0 = \infty$
 d. $R_i = 0$, $A = \infty$, $R_0 = \infty$
77. The circuit in the figure is a

 a. Low- pass filter
 b. High- pass filter
 c. Band- pass filter
 d. Band- stop filter
78. An equivalent 2's complement representation of the 2's complement number 1101 is
 a. 110100
 b. 001101
 c. 110111
 d. 111101
79. The output of a logic gate is '1' when all its inputs are at logic '0'. The gate is either
 a. a NAND or an EX-OR gate
 b. a NOR or an EX-NOR gate
 c. an OR or an EX-NOR gate
 d. an AND or an EX-OR gate
80. For the logic circuit shown in Figure, the required input condition (A, B, C) to make the output (X)=1.

 a. 1, 0, 0
 b. 0, 0, 1
 c. 1, 1, 1
 d. 0, 1, 1
81. The logic realized by the circuit shown in figure is

 a. $F = A \odot C$
 b. $F = A \oplus C$
 c. $F = B \odot C$
 d. $F = B \oplus C$

82. The circuit given below is a



- J- K Flip- flop
- Toggle Flip- flop
- SR Flip- flop
- Master- Slave D Flip- flop

83. The minimum number of MOS transistors required to make a dynamic RAM cell is

- 1
- 2
- 3
- 4

84. The advantage of using a dual slope ADC in a digital voltmeter is that

- its conversion time is small
- its accuracy is high
- it gives output in BCD format
- it does not require a comparator

85. The resolution of a 4-bit counting ADC is 0.5 Volts. For an analog input of 6.6 Volts, the digital output of the ADC will be

- 1011
- 1101
- 1100
- 1110

86. The number of hardware interrupts (which require an external signal to interrupt) present in an 8085 microprocessor are

- 1
- 4
- 5
- 13

87. An I/O processor control the flow of information between

- cache memory and I/O device
- main memory and I/O device
- two I/O devices
- cache and main memories

88. The following sequence of instructions are executed by an 8085 microprocessor:

1000: LXI SP, 27FF

1003: CALL 1006

1006: POP H

The contents of the stack pointer (SP) and the HL register pair on completion or execution of these instruction are

- SP = 27FF, HL = 1003
- SP = 27FD, HL = 1003
- SP = 27FF, HL = 1006
- SP = 27FD, HL = 1006

89. The physical layer is responsible for

- Flow control
- Modulation and coding
- Congestion control
- medium access

90. In a coil with 1000 turns, if the flux through each turn is $(t^2 - 2t)$ mWb, the magnitude of the induced emf in the coil at a time of 8sec is

- 1.4V
- 14V
- 1.4mV
- 1.4 μ V

91. For a reflector of diameter 10 meter, operating frequency=3 GHz, efficiency = 70%, gain of the antenna is approximately

- 1500
- 2800
- 2200
- none of the above

92. Which among the following is regarded as a condition of an ordinary endfire array?

- $\alpha < \beta d$
- $\alpha > \beta d$
- $\alpha = \pm \beta d$
- $\alpha \neq -\beta d$

93. The angle between electric and magnetic fields in a waveguide is :
- 90°
 - 0°
 - 180°
 - 360°
94. If the normalized admittance at a point on a transmission line to be matched is $1+j1.47$. Then the normalized susceptance of the stub used for shunt stub matching is:
- 1 Ω
 - 1.47 Ω
 - 1 Ω
 - 1.47 Ω
95. The cut off frequency of the TEM wave is
- 0
 - 1 GHz
 - 6 GHz
 - infinity
96. The approximate loaded Q due to dielectric loss for a dielectric resonator given the loss tangent is 0.0001 is:
- 1000
 - 500
 - 2000
 - 10000
97. If modulation index of an AM wave is changed from 0 to 1, the transmitted power
- Increased by 50%
 - Increased by 75%
 - Increased by 100%
 - Remains unaffected
98. If there are M messages and each message has probability $p=1/M$, the entropy is
- 0
 - 1
 - $\log_2 M$
 - $M \log_2 M$
99. Viterbi decoding is one of the most commonly used techniques in modern systems that are used to decode the data encoded by
- Block coding
 - Hamming coding
 - Convolution coding
 - CRC coding
100. A signal $x(t) = 100 \cos(24\pi \times 10^3) t$ is ideally sampled with a sampling period of 50 μsec and then passed through an ideal low pass filter with cutoff frequency of 15 kHz. Which of the following frequency is/are present at the filter output?
- 12 kHz only
 - 12 kHz and 8 kHz
 - 12 kHz and 9 kHz
 - 8 kHz only
101. In a BPSK signal detector, the local oscillator has fixed phase error of 20°. By what factor does this phase error deteriorate the SNR at the output?
- $\cos^2 20^\circ$
 - $\cos 20^\circ$
 - $\cos 40^\circ$
 - $\cos 70^\circ$
102. If the number bits per sample in a PCM system is increased from n to $(n+1)$, the improvement in signal to quantization noise ratio will be
- 3 dB
 - 6 dB
 - $2n$ dB
 - $4n$ dB
103. The size of an IP address in IPv6 is
- 32 bits
 - 64 bits
 - 128 bits
 - 265 bits

104. What is the maximum number of IP addresses that can be assigned to hosts on a local subnet that uses the 255.255.255.224 subnet mask?
- 14
 - 15
 - 16
 - 30
105. If an Ethernet port on a router were assigned an IP address of 172.16.112.1/25, what would be the valid subnet address of this host?
- 172.16.112.0
 - 172.16.0.0
 - 172.16.96.0
 - 172.16.255.0
106. Due to Stimulated Raman Scattering phenomenon in a Mutichannel WDM system, optical power transfers
- between equal frequency channels
 - from longer to shorter wavelength channel
 - from shorter to longer wavelength channel
 - from lower to higher frequency channel
107. Many simultaneous light paths using same wavelength in a WDM wavelength Routing Network is possible with the use of
- Switches
 - Routers
 - wavelength converters
 - Add-Drop multiplexers
108. Which band/s specifies the operation range of Erbium doped fiber amplifier (EDFA)?
- By O band
 - By C band
 - By S band
 - All of the above
109. For the given sequence $x(n) = 2\delta(n-2) - \delta(n+1) + 3\delta(n) - \delta(n-1) + 2\delta(n-2)$, value of $X(e^{j\omega})$ at $\omega = \pi$ is
- 5
 - 7
 - 1
 - 9
110. The deviation of the group delay from a constant for the filters indicates the degree of
- symmetry of the phase
 - non-linearity of the phase
 - linearity of the phase
 - non-symmetry of the phase
111. The poles of a Chebyshev filter lie on
- circle
 - parabola
 - helix
 - ellipse
112. Which of the following statements are true for a causal and/or stable LTI system?
- All poles lie on the left half S Plane
 - ROC is the region to the right of right most pole
 - Some poles are Positive
- 1 and 2
 - 2 and 3
 - All of the above statements
 - None of the above statements
113. FIR filter is always stable because all of its
- poles are at the origin
 - zeros are at the origin
 - poles are at the infinity
 - zeros are at the infinity
114. A unity negative feedback system has an open-loop transfer function $G(s) = \frac{K}{s(s+1)}$. The gain K for the system to have a damping ratio of 0.25 is _____.
- 0
 - 400
 - 800
 - 500
115. A _____ is a data communication system within a building, plant, or campus, or between nearby buildings.
- LAN
 - MAN
 - WAN
 - None of the above