PART III

04 - ELECTRONICS AND COMMUNICATION ENGINEERING

(Answer ALL questions)

41. Transfer characteristics of JFET is drawn between
    a. V_{DS} and I_D
    b. V_{DS} and I_G
    c. V_{GD} and I_D
    d. V_{GS} and I_D

42. ———————— capacitance affects high frequency response of CE amplifier.
    a. C_{ce}
    b. C_{be}
    c. C_{gd}
    d. C_{bc}

43. Forward current of 75mA passes through a diode for a forward drop of 0.6V. Find the forward resistance of the diode.
    a. 7Ω
    b. 8Ω
    c. $9.3\,k\Omega$
    d. $10.7\,k\Omega$

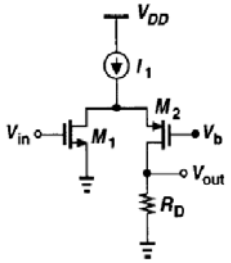
44. Early effect in bipolar transistor is caused by
    a. Fast turn on
    b. Fast turn off
    c. Large collector base reverse bias
    d. Large emitter base forward bias

45. Find the operating region of N-channel MOSFET with V_{GS} = 1.4V, V_{TN} = 0.5V, V_{DS} = 1.8V
    a. Linear
    b. Cut-off
    c. Triode
    d. Saturation

46. High frequency response of CS amplifier has a Miller multiplier equal to
    a. $1+g_mR_L'$
    b. $-g_mR_L'$
    c. $1/g_mR_L'$
    d. $1/g_m$

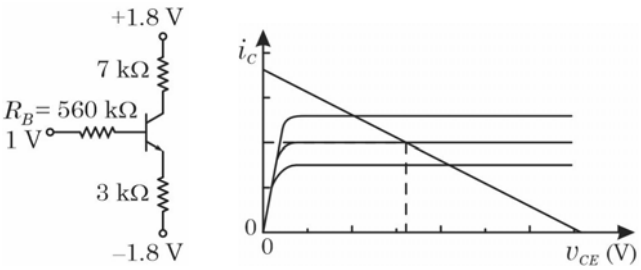
47. Find the differential mode gain of differential amplifier with CMRR of 5200 and common mode gain of 0.015V/V
    a. 0.012V/V
    b. 120V/V
    c. 7.8V/V
    d. 78V/V

48. Amplifier configuration shown in the below Figure is with MOSFETS M1, M2 connected respectively in a configuration given by



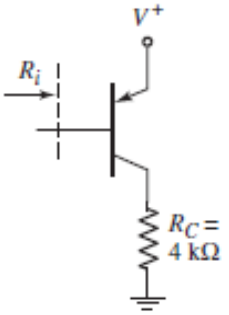
    a. Common Source and Common Drain
    b. Common Gate and Common Drain
    c. Common Source and Common Gate
    d. Common Gate and Common Source

49. Consider the circuit shown in the below Figure and its load line characteristic. The x-intercept of the load line is



    a. 3.6V
    b. 0
    c. 1.8V
    d. 1V

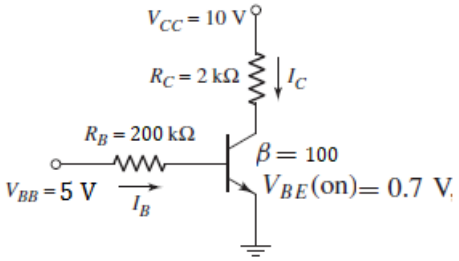
50. Parameters of the transistor shown in the circuit below are $\beta = 100$, I_{CQ} = 1mA. Input resistance R_i of the circuit is



    a. $5\,k\Omega$
    b. $2.6\,k\Omega$
    c. $400\,k\Omega$
    d. $3\,k\Omega$

collegedunia

51. For the circuit shown in the Figure below, g_m of the transistor is



a. 0.0635A/V
b. 0.0827A/V
c. 0.026A/V
d. 0.071A/V

52. How many AND gates are required to construct a 4 – bit parallel multiplier if four 4 – bit parallel binary adders are given?
a. Sixteen 2 – input AND gates
b. Eight 2 – input AND gates
c. Four 2 – input AND gates
d. Two 2 – input AND gates

53. Which of these error-detecting codes enables to find double errors in Digital Electronic devices?
a. Bit generation method
b. Odd-Even method
c. Parity method
d. Check sum method

54. In order to check the CLR function of a counter
a. Connect the CLR input to Vcc and check to see if all of the Q outputs are HIGH
b. Ground the CLR input and check to be sure that all of the Q outputs are LOW
c. Apply the active level to the CLR input and check all of the Q outputs to see if they are all in their reset state
d. Connect the CLR to its correct active level while clocking the counter; check to make sure that all of the Q outputs are toggling

55. Why the feedback circuit is said to be negative for voltage series feedback amplifier?
a. Input voltage is 180° out of phase with respect to feedback voltage
b. Feedback voltage is 180° out of phase with respect to input voltage
c. Input voltage is in same phase with respect to feedback voltage
d. Feedback voltage is in same phase with respect to input voltage

56. A linear, bilateral, electrical network produces 2A current through a load when the network was energized by a 20V source. If the network is energized by 40V source, the current through the load will be
a. 8 A
b. 6 A
c. 4 A
d. 2 A

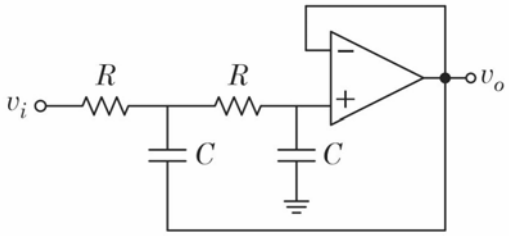
57. Choose the minimum number of op-amps required to implement the given expression.

$$V_o = \left[1 + \frac{R_2}{R_1}\right] V_1 - \frac{R_2}{R_1} V_2$$

a. Two
b. Four
c. Three
d. One

58. Calculate the value of LSB and MSB of a 12-bit DAC for 10V.
a. LSB = 2.4 mV; MSB = 5 V
b. LSB = 2.4 mV; MSB = 10 V
c. LSB = 4.8 mV; MSB = 5 V
d. LSB = 4.8 mV; MSB = 10 V

59. Which type of filter is shown in the figure?



a. Low Pass Filter
b. High Pass Filter
c. Band Pass Filter
d. Band Reject Filter

60. The output voltage of phase detector is
a. Phase voltage
b. Free running voltage
c. Error voltage
d. None of the above

61. Which characteristic of PLL is defined as the range of frequencies over which PLL can acquire lock with the input signal?
a. Free-running state
b. Pull-in time
c. Lock-in range
d. Capture range

collegedunia

62. In 8085 microprocessor, unfortunately, two address lines namely A13 and A6 have become faulty and are stuck at logic 0. Which of the following address locations cannot be accessed in the memory?

a. 0000H
b. 1F1FH
c. 1FFFH
d. 1F0FH

63. It is desired to mask the higher order bits (D_7-D_4) of the data bytes in register C. consider the following set of 8085 instruction,

(i)
```
MOV  A, C
ANI  F0H
MOV  C, A
HLT
```
(ii)
```
MOV  A, C
MVI  B, F0H
ANA  B
MOV  C, A
HLT
```
(iii)
```
MOV  A, C
MVI  B, 0FH
ANA  B
MOV  C, A
HLT
```
(iv)
```
MOV  A, C
ANI  0FH
MOV  C, A
HLT
```

The instruction set, which execute the desired operation is

a. (i) and (ii)
b. (iii) and (iv)
c. Only (i)
d. Only (iv)

64. The instruction XLAT in 8086 microprocessor is used to

a. Translate a byte in AL using a table index
b. Transfer data from source to destination
c. Push the contents of specified source on to the stack
d. Exchange the contents of source with destination

65. For the given 8086 microprocessor instructions below, which is an invalid instruction?

a. MOV BX, [0301 H]
b. MOV CX, 037AH
c. MOV AL,BL
d. MOV DS, 4100H

66. Match the following: For 8086 microprocessor,

A. Program memory	1. It can be located at odd memory addresses
B. Data memory	2. Jump and call instructions can be used for short jumps within selected 64 KB code segment
C. Stack memory	3. The size of the data accessible memory is limited to 256 KB
D. Cache memory	4. Storage device placed in between processor and main memory

a. A-3, B-4, C-2, D-1
b. A-2, B-1, C-3, D-4
c. A-2, B-3, C-1, D-4
d. A-2, B-3, C-4, D-1

67. Moist soil has a conductivity of $\sigma = 10^{-3}$ S/m and Єr = 2.5. Find conduction current J_C. Given, $E = 6 \times 10^{-6} \sin 9 \times 10^9 t$ V/m

a. $6 \times 10^{-9} \sin 9 \times 10^9 t$ A/m²
b. $46 \times 10^{-3} \sin 9 \times 10^3 t$ A/m²
c. $6.67 \times 10^{-4} \sin 9 \times 10^4 t$ A/m²
d. $0.065 \times 10^{-2} \sin 9 \times 10^7 t$ A/m²

68. A wave is incident at an angle of 30°, from air to Teflon. Find the angle of transmission. Given, Єr = 2.1, $\mu_1 = \mu_2$

a. 60.19°
b. 39.47°
c. 30°
d. 20.18°

69. Calculate the propagation constant Y for a conducting medium in which σ = 58 MS/m, μ_r=1 and f = 100 MHz.

a. 2.14×10^6 angle 90° m^{-1}
b. 2.14×10^2 angle 60° m^{-1}
c. 2.14×10^9 angle 15° m^{-1}
d. 2.14×10^5 angle 45° m^{-1}

collegedunia

70. On a radio frequency transmission line, the velocity of signals at a frequency of 125 MHz is 2.1×10^8 m/sec. What is the wavelength of the signal on the line?
a. 1.32 m
b. 1.16 m
c. 1.68 m
d. 1.93 m

71. When an arbitrary length of any general transmission line, is terminated in an open circuit or a short circuit, its input impedance is determined completely by
a. the propagation factors, the characteristic impedance and line length
b. the propagation factors and line length
c. the characteristic impedance and line length
d. the propagation factors alone

72. A mode is a combination of a voltage V and current I, which propagate along z according to the common propagation factor of
a. $\exp(j\omega t - yz)$ and which, maintains a constant relationship between V and I
b. $\exp(j\omega t + yz)$ and which, maintains a constant relationship between α and β
c. $\exp(j\omega t)$ and which, maintains a constant relationship between α and β
d. $\exp(yz\ t)$ and which, maintains a constant relationship between V and I

73. In the absence of attenuation on the line $(\alpha = 0)$, the Voltage Standing Wave Ratio (VSWR) is
a. The same everywhere on a uniform, source free section of line
b. Infinity on a uniform, source free section of line
c. Zero on a uniform, source free section of line
d. –1 on a uniform, source free section of line

74. Consider an air filled rectangular waveguide with a cross – section of 5 cm × 3 cm. For this waveguide, the cut off frequency (in MHz) of TE_{21} mode is
a. 7810 MHz
b. 7.81 MHz
c. 78.1 MHz
d. 781 MHz

75. The far field of an antenna varies with distance r as
a. $1/r$
b. $1/r^2$
c. $1/r^3$
d. $1/\sqrt{r}$

76. What is the nature of radiation pattern of an isotropic antenna?
a. Spherical
b. Dough-nut
c. Elliptical
d. Hyperbolic

77. The modulation index of amplitude modulation system is limited to unity because of
a. transmission requires higher power for higher values of modulation index
b. modulated signal bandwidth is higher for higher values of modulation index
c. demodulated signal is distorted while coherent receiver is used
d. demodulated signal is distorted while envelop detector is used as receiver

78. A 4×1 multiplexer is used to multiplex 3 signals $\{A, B, C\}$ with highest frequency components $\{250\,\text{Hz}, 100\text{Hz}, 600\,\text{Hz}\}$ respectively. Each channel is uniformly sampled at constant rate with the help channel selector clock (F_{sel}). The input channels $\{I_1, I_2, I_3, I_4\}$ of the multiplexers are connected to the signals as $\{A, C, B, C\}$ respectively. What is the minimum value F_{sel} in order to recover the signals from their samples?
a. 100 Hz
b. 500 Hz
c. 600 Hz
d. 1200 Hz

79. NRZ and QPSK are _____ respectively.
a. Baseband and baseband signaling schemes
b. Baseband and pass band signaling schemes
c. Pass band and pass band signaling schemes
d. Error control and source coding schemes

collegedunia

80. Let an error control system uses (16, 3) block codes. The coding efficiency of the system will be
   a. 3 bits
   b. 16 bits
   c. 48
   d. 3/16

81. A direct sequence spread spectrum technique uses 10 flip-flop linear feedback shift register as PN code generator. The jamming margin produced by the system will be
   a. 10 dB
   b. 20 dB
   c. 30 dB
   d. 40 dB

82. Which of the following statements is true about error detection techniques used on communications link?
   a. Cyclic Redundancy Check (CRC) sequence can detect as well as correct errors
   b. Error detection alone cannot be used on simplex links
   c. (7, 4) Hamming code can detect up to 3-bit errors
   d. All of the above

83. Which of the following Light source is popularly used in optical communication?
   a. Visible light
   b. Ultraviolet
   c. Infrared
   d. Radio frequency

84. The Numerical aperture of a fiber describes the ———————— characteristics.
   a. Light scattering
   b. Light collection
   c. Light dispersion
   d. Light polarisation

85. When mean optical power launched into an 8 km length of fiber is 12 μW, the mean optical power at the fiber output is 3 μW. Find the overall signal attenuation in dB
   a. 15 dB
   b. 16 dB
   c. 10 dB
   d. 12 dB

86. The orthogonal signals S_1 and S_2 satisfy the following relation.
   a. $\int_0^T s_1(t)s_2(t)dt = 0$
   b. $\int_0^T s_1(t)s_2(t)dt = 1$
   c. $\int_0^T s_1(t)s_2(t)dt = \infty$
   d. Both (b) and (c)

87. In a PCM system, speech signal bandlimited to 4 kHz is sampled at 1.5 time Nyquist rate and quantized using 256 levels. The bit rate required to transmit the signal will be
   a. 64 kbps
   b. 96 kbps
   c. 128 kbps
   d. 160 kbps

88. If the data rate of delta modulator output is 43.2 kbps, for the input signal of 3.6 kHz, then the sampling rate used is equal to,
   a. 4 times the Nyquist rate
   b. 6 times the Nyquist rate
   c. 12 times the Nyquist rate
   d. 3 times the Nyquist rate

89. An AM modulator develops an unmodulated power output of 400W across a 50Ω resistive load. The carrier is modulated by a single tone with a modulation index of 0.6. If this AM signal is transmitted, the power developed across the load is,
   a. 428 W
   b. 432 W
   c. 472 W
   d. 418 W

90. The Modulating frequency in narrow band frequency modulation is increased from 10 kHz to 20 kHz. The bandwidth is
   a. Doubled
   b. Halved
   c. Increased by 10 kHz
   d. Decreased by 10 kHz

collegedunia

91. Which of the following causal analog transfer functions is used to design causal IIR digital filter with transfer function?

$$H(z)=\frac{0.05z}{z-e^{-0.42}}+\frac{0.05z}{z-e^{-0.2}}$$

Assume impulse invariance transformation with T = 0.1s.

a. $H(S)=\frac{0.5}{S+4.2}+\frac{0.5}{S+2}$

b. $H(S)=\frac{0.5}{S+2.1}+\frac{0.5}{S+4}$

c. $H(S)=\frac{0.5}{S-2.1}+\frac{0.5}{S-4}$

d. $H(S)=\frac{0.5}{S-4.2}+\frac{0.5}{S-2}$

92. The shape of the rectangular window function is changed to other function such as Hamming and Blackman window functions so that

a. the sidelobe amplitude decreases while decreasing transition band width
b. the sidelobe amplitude increases while increasing transition band width
c. the sidelobe amplitude decreases while increasing transition band width
d. the sidelobe amplitude increases while decreasing transition band width

93. Window function used in FIR realization,

a. truncates the impulse response
b. minimize power leakage in side lobes
c. increases main lobe width
d. does all

94. The new pole locations due to truncation of coefficient to 4 bit including sign bit in the cascade realization

$$H(z)=\frac{1}{\left(1-0.95z^{-1}\right)\left(1-0.25z^{-1}\right)}$$

a. 0.5, 0.25
b. 0.875, 0.25
c. 0.95, 0.5
d. 0.75, 0.125

95. The number 110000000.010.....000 represented in IEEE single precision format corresponds to the decimal number

a. –2.5
b. –1.25
c. –2.15
d. –2.75

96. The transfer function of first order high pass digital Butterworth filter that has 3dB cut off frequency $\omega_c=0.15\,\pi$ using bilinear transformation with T = 1s

a. $H(z)=\frac{1}{1-0.24\left[\frac{z+1}{z-1}\right]}$

b. $H(z)=\frac{1}{1+0.15\left[\frac{z+1}{z-1}\right]}$

c. $H(z)=\frac{1}{1+0.24\left[\frac{z-1}{z+1}\right]}$

d. $H(z)=\frac{1}{1+0.48\left[\frac{z+1}{z-1}\right]}$

97. The signal to quantization noise ratio of an analog to digital converter having full scale range of ±1 volt for seven bit word length is 42dB. The approximate value of signal to quantization noise ratio for 9 bit word length is

a. 44 dB
b. 24 dB
c. 54 dB
d. 75 dB

98. A digital filter with impulse response $h[n]=2^n u[n]$ will have transfer function with region of convergence

a. includes unit circle
b. excludes unit circle
c. bounded by rings with circles of radius 0.5 and 2
d. entire z-plane excluding origin and infinite

99. The number of multipliers and delay elements required in direct form II realization of $H(z)=\frac{1+0.5z^{-1}-2z^{-2}}{1+z^{-1}-z^{-2}}$

a. 5, 2
b. 3, 4
c. 6, 4
d. 3, 2

100. The output noise variance due to 8 bit ADC of first order filter with $H(z)=\frac{1}{1-0.25z^{-1}}$ for the input signal with noise variance σ^2 is

a. $1.5\sigma^2$
b. $1.06\sigma^2$
c. $0.25\sigma^2$
d. $1.25\sigma^2$

collegedunia