

10. If the stability error for step input and speed of response be criteria for design , what controller would you recommend

A P controller	B PD controller
C PI controller	D PID controller
11. In case of delta connected circuit , when one resistor is open , the power will be

A Zero	B Reduced by 2/3
C Reduced by 1/3	D None of these
12. In series LCR circuit , at resonance

A Current is maximum , power factor is zero	B Current is maximum , power factor is unity
C Current is minimum , power factor is unity	D None of these
13. Which of the following theorms enables a number of voltage(or current) source to be combined directly into a single voltage (or current) source ?

A Compensation theorm	B Reciprocity theorm
C Superposition theorm	D Millman's theorm
14. Two coupled coils of $L_1 = 0.8$ H and $L_2 = 0.2$ H have a coupling coefficient of $K = 0.9$. The mutual inductance M is

A 0.144 H	B 0.23 H
C 0.36 H	D 0.43 H
15. For a two port network , the output short circuit current was measured with a 1 V source at the input. The value of current gives

A h_{12}	B y_{12}
C h_{21}	D y_{21}
16. If a transistor is operating with both of its junctions forward biased , but with the collector base forward bias greater than the emitter base forward bias , then it will be operating in the

A Forward active mode	B Reverse saturation mode
C Reverse active mode	D Forward saturation mode
17. The common-emitter short circuit current gain of a transistor

A Is a monotonically increasing of the collector current I_c	B Is a monotonically decreasing function of I_c
C Increases for with I_c for low I_c , reaches maximum , and then decreases in I_c	D Is not a function of I_c
18. For a MOS capacitor fabricated on a p type semiconductor , strong inversion occurs when surface potential is

A Equal to Fermi potential	B Zero
C Negative and equal to Fermi potential in magnitude	D positive and equal to twice Fermi potential in magnitude
19. In a common emitter BJT amplifier , the maximum usable supply voltage is limited by

A Avalanche breakdown of base-emitter junction	B Collector-base breakdown voltage with emitter open
C Collector-emitter breakdown voltage with base open	D Zener breakdown voltage of the emitter base junction
20. In phototransistor , light is focused to fall on

A Emitter to base junction	B Collector to base junction
C Base region only	D All of these

21. The input differential stage of op-amp 741 is biased at about $10\ \mu\text{A}$ current. Such a low current of the input stage gives
- | | |
|------------------------|--------------------------|
| A High CMRR | B High differential gain |
| C High input impedance | D All of these |
22. The oscillator most suitable as an oscillator at a frequency of $100\ \text{Hz}$ is
- | | |
|----------------------|-----------------------|
| A Hartley oscillator | B Colpitts oscillator |
| C Crystal oscillator | D Twin-T oscillator |
23. In active region operation of a transistor
- | | |
|---|---|
| A Both junctions are reverse biased | B Both junctions are forward biased |
| C Emitter junction is forward biased while collector junction is reverse biased | D Emitter junction is reverse biased while collector junction is forward biased |
24. Most important application of tunnel diode is as
- | | |
|-------------------------------|--|
| A Rectifier | B Switching device in digital circuits |
| C Voltage controllable device | D Oscillator |
25. In a BJT with $I_{\text{CO}} = 1\ \mu\text{A}$, $\alpha = 0.99$, the value of I_{CEO} is
- | | |
|-----------------------|----------------------|
| A $0.01\ \mu\text{A}$ | B $0.1\ \mu\text{A}$ |
| C $1\ \mu\text{A}$ | D $100\ \mu\text{A}$ |
26. An air gap is usually inserted in magnetic circuit to
- | | |
|---------------------|----------------------|
| A Increase the flux | B Prevent saturation |
| C Increase mmf | D None of these |
27. Capacitor of $40\ \mu\text{F}$ is charged to a potential difference of $500\ \text{V}$. The energy stored in the electrical field between the plates of this condenser is
- | | |
|--------------|-------------|
| A 4.5 joules | B 4 joules |
| C 5 joules | D 40 joules |
28. What is the force experienced per unit length by a conductor carrying $5\ \text{A}$ current in positive Z direction and placed in a magnetic field $\mathbf{B} = 3\mathbf{a}_x + 4\mathbf{a}_y$?
- | | |
|---|--|
| A $15\mathbf{a}_x + 20\mathbf{a}_y\ \text{N/m}$ | B $-20\mathbf{a}_x + 15\mathbf{a}_y\ \text{N/m}$ |
| C $20\mathbf{a}_x - 15\mathbf{a}_y\ \text{N/m}$ | D $-20\mathbf{a}_x - 20\mathbf{a}_y\ \text{N/m}$ |
29. What is the value of total flux coming out of a closed surface?
- | | |
|---|---------------------------------------|
| A Zero | B Equal to volume charge density |
| C Equal to the total charge enclosed by the surface | D Equal to the surface charge density |
30. A flat slab of dielectric, $\epsilon_r = 5$ placed normal to a uniform field with flux density $D = 1\ \text{coulomb/m}^2$. The slab is uniformly polarized. What is the polarization P of the slab in coulomb/m^2 ?
- | | |
|-------|-------|
| A 0.8 | B 1.2 |
| C 4 | D 6 |
31. In a satellite ground station, the received signal is directly amplified in a low noise parametric amplifier followed by an FET amplifier. The gains and effective noise temperatures of the amplifiers are $20\ \text{dB}$, $9.0\ \text{K}$, and $10\ \text{dB}$, $200\ \text{K}$ respectively. The effective noise temperature of the combination is
- | | |
|--------------------|------------------|
| A $11.0\ \text{K}$ | B $20\ \text{K}$ |
| C $29.0\ \text{K}$ | D $39\ \text{K}$ |
32. In a reflex klystron, the velocity modulation
- | | |
|-------------------------------------|-------------------------------|
| A Occurs near the reflector | B Occurs in the resonator gap |
| C Occurs near the accelerating grid | D Does not occur at all |

33. In a rectangular waveguide with broader dimension a and narrow dimension b , the dominant mode of microwave propagation would be
 A TE_{10} B TM_{10}
 C TE_{01} D TM_{01}
34. Which one of the following frequency bands is allocated by ITU for DBS(also referred to as DTH – Direct to Home Service) ?
 A 10-12 GHz B 6-4 GHz
 C 2-1 GHz D 42-40 GHz
35. An IMPATT diode has a drift length of $4\text{ }\mu\text{m}$. The drift velocity of Si is 10^5 m/s . The operating frequency of the IMPATT diode is
 A 25 GHz B 20 GHz
 C 12.5 GHz D 125 MHz
36. To permit the selection of 1 out of 16 equiprobable events the number of bits required is
 A 2 B $\log_{10}16$
 C 8 D 4
37. In a broadcast superheterodyne receiver the
 A Local oscillator operates below the signal frequency B Mixer input must be tuned to the signal frequency
 C Local oscillator frequency is double the IF D RF amplifier normally doubles the RF
38. The difference between phase and frequency modulation
 A Is purely theoretical because they are the same in practice B Is too great to make the two systems compatible
 C Lies in the poor audio response of phase modulation D Lies in the different definition of the modulation index
39. A band limited signal has no spectral components above the frequency of 100 kHz. The signal can be uniquely determined by its value at uniform intervals of duration less than
 A $2\text{ }\mu\text{ sec}$ B $5\text{ }\mu\text{ sec}$
 C $10\text{ }\mu\text{ sec}$ D $3\text{ }\mu\text{ sec}$
40. For satellite communication, the frequency should be
 A Less than the critical frequency of ionosphere B Equal to the critical frequency of ionosphere
 C More than the critical frequency of ionosphere D None of these
41. If the diameter of the parabolic reflectors of a microwave antenna is doubled, its gain will increase by
 A 0 dB B 2 dB
 C 4 dB D 6 dB
42. To convert narrow band FM to wide band FM modulation is increased by
 A Frequency multiplication B Frequency division
 C Frequency translation D None of these
43. The function of an amplitude limiter in an FM receiver is

- A To eliminate any change in amplitude of received FM signal B To reduce the amplitude of the signal to suit IF amplifier
C To amplify low frequency signals D None of these
44. A carrier is simultaneously modulated by sine waves with modulation indices of 30 % and 40 % respectively. The over all modulation index will be
A 50 % B 70 %
C 100 % D Indefinite as modulation by two waves simultaneously is not possible
45. In a mesh topology communication network , if there are N stations , the total number of possible full duplex links is
A N-1 B $N(N-1)$
C $N(N-1)/2$ D $(N-1)/2$
46. The most heavily doped region in a transistor is
A Base B Collector
C Emitter D Both emitter and collector
47. The negative feedback is more effective if the loop gain is
A Small B Large
C Unity D zero
48. In order to convert RC-coupled amplifier to a wide band amplifier , it is necessary
A To compensate for low frequency drop off B To compensate for high frequency drop-off
C To compensate harmonic phase shifts that are not proportional to the frequency of the harmonics D All of these
49. The current stability of a common collector amplifier can be improved by
A Decreasing emitter and base resistance B Increasing emitter and base resistance
C Decreasing emitter resistance and increasing base resistance D Increasing emitter resistance and decreasing base resistance
50. TTL has which of the following advantage over CMOS
A Lower PD B Use of transistors alone as circuit elements
C Greater suitability for LSI D Simpler fabrication process
51. In an ideal balanced differential amplifier , the common mode gain is
A Doubles that of single ended amplifier B Half of that of single ended differential amplifier
C Very high D zero
52. In a MOSFET if gate voltage V_{GS} is increased then
A Mobile charge carrier density decreases B Channel conductivity increases
C Channel widens D Channel conductivity decreases

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- C 11101100 D None of these
62. The gray code for decimal number 6 is
A 1100 B 1001
C 0101 D 0110
63. Following two functions are to be realized by using 3:8 demultiplexer and additional appropriate type of gates that would result in minimum chip count
 $f_1(A,B,C) = \prod_M (1,3,5,7)$
 $f_2(A,B,C) = \sum_m (0,2,4,5,6,7)$
 Which one of the following gates would fulfill this requirements ?
 A One 4-input NAND + one 8-input NAND B Three 2-input ANDs
 C Seven 2-input NANDs D One 4-input AND + one 8-input NAND
64. The number of flip-flops required to build a mod-19 counter is
A 4 B 5
C 6 D 7
65. A full adder circuit may be constructed by using
A Two 2-input AND gates and two 3-input OR gates B Two half adder and a 2-input AND gate
C Two half adder and a 2-input OR gate D Two 2-input AND gates and two 3-input XOR gates
66. The system characterized by the equation $y(t) = a x(t) + b$ is
A Linear for any value of b B Linear if $b > 0$
C Linear if $b < 0$ D nonlinear
67. What is the Laplace transform of $x(t) = -e^{2t} u(t) * (t u(t))$?
A $-1/(s^2 (s+2))$ B $-1/(s^2 (s-2))$
C $1/(s^2 (s-2))$ D $-1/(s (s-2))$
68. The impulse response of a system is $h(n) = a^n u(n)$. What is the condition for the system to be BIBO stable ?
A a is real and positive B a is real and negative
C $|a| > 1$ D $|a| < 1$
69. the continuous time system described by $y(t) = x^2(t)$ is
A Causal, linear and time varying B Causal, non linear and time varying
C Non causal, nonlinear and time invariant D Non causal and time variant
70. For an LTI system $x(n) = k\delta(n)$, $y(n) - (1/2)y(n-1) = x(n)$.
What is $y(n)$ equal to ?
A k B $(1/2)^n k$
C $n k$ D 2^n
71. The lengths of two discrete time sequences $x_1(n)$ and $x_2(n)$ are 5 and 7, respectively. What is the maximum length of a sequence $x_1(n) * x_2(n)$?
A 5 B 6

- C 7 D 11
72. What is the spectral density of white noise
 A A constant B $\delta(w)$
 C $[\delta(w)]^2$ D A step function in w
73. Number of state variables of discrete time system described by
 $y(n) - (3/4)y(n-1) + (1/8)y(n-2) = x(n)$ is
 A 2 B 3
 C 4 D 1
74. Unit step response of the system described by the equation $y(n) + y(n-1) = x(n)$ is
 A $z^2 / (z+1)(z-1)$ B $z / (z+1)(z-1)$
 C $(z+1)/(z-1)$ D $z(z-1)/(z+1)$
75. z and laplace transform are related by
 A $s = \ln z$ B $s = (\ln z) / T$
 C $s = z$ D $s = T / (\ln z)$
76. In 8085 microprocessor the value of the most significant bit of the result of the following the execution of any arithmetic or Boolean instruction is stored in
 A Carry status flag B Auxiliary carry status flag
 C Sign status flag D Zero status flag
77. In a microprocessor when a CPU is interrupted , it
 A Stops execution of instructions B Acknowledges interrupt and branches to subroutine
 C Acknowledges interrupt and continues D Acknowledges interrupt and waits for the next instruction from the interrupting device
78. Which one of the following is not a characteristic of RISC processor ?
 A One instruction per cycle B Register-to-register operations only
 C Simple address modes D Register to memory operations only
79. A typical cell , for a dynamic RAM can be implemented by using how many MOS transistors ?
 A Six B Five
 C One D Two
80. Which one of the following addressing modes is used in the instruction PUSH B
 A Direct B Register
 C Register indirect D Immediate
81. The Newton-Raphson iteration $x_{n+1} = \frac{1}{2} \left(x_n + \frac{R}{x_n} \right)$ can be used to compute the
 A square root of R B reciprocal of R

C square of R

D logarithm of R

82. Calculate the series $x_{n+1} = \frac{x_n}{2} + \frac{9}{8x_n}$, $x_0 = 0.5$ obtained from the NR method. The series converges to

A 1.5

B 1.6

C 1.21

D 1.4

83. A dice is thrown 6 times. If “getting an odd number” is a “success”, what is the probability of at least 5 successes?

A 1/64

B 7/64

C 3/32

D 63/64

84. Two dice are thrown simultaneously. What is the probability of getting a total of at least 10?

A 2/3

B 5/36

C 3/7

D 1/6

85. If $f^*(x)$ is the complex conjugate of $f(x) = \cos(x) + i \sin(x)$, then for real a and

b , $\int_a^b f^*(x) f(x) dx$ is always

A negative

B positive

C real

D imaginary

86. If $x = \sqrt{-1}$, then the value of x^x is

A 1

B $e^{\pi/2}$

C x

D $e^{-\pi/2}$

87. Find the Taylor's expression of $f(z) = \frac{1}{(z+1)^2}$ about the point $z = -i$.

A $\left[\sum_{n=2}^{\infty} (-1)^n \frac{(z-i)^n}{(1+i)^{n+1}} \right]$

B $\frac{i}{2} \left[1 + \sum_{n=0}^{\infty} (-1)^n \frac{(n+1)(z+i)^n}{(1+i)^n} \right]$

C $\frac{i}{2} \left[\sum_{n=0}^{\infty} (-1)^n \frac{(n+1)(z+i)^n}{(1-i)^n} \right]$

D $\frac{i}{2} \left[\sum_{n=2}^{\infty} (-1)^n \frac{(z-i)^n}{(1+i)^{n+1}} \right]$

88. If a and b are constants, the most general solution of the differential equation

$$\frac{d^2x}{dt^2} + 2\frac{dx}{dt} + x = 0 \text{ is}$$

A $ae^{-t} + bte^{-t}$

B ae^{-t}

C $ae^t + bte^{-t}$

D $ae^{-t} + be^{-2t}$

89. The solution of $x \frac{dy}{dx} + y = x^4$ with the condition $y(1) = \frac{6}{5}$ is

A $y = \frac{4x^4}{5} + \frac{4}{5x}$

B $y = \frac{x^4}{5} + 1$

C $y = \frac{x^4}{5} + \frac{1}{x}$

D $y = \frac{x^5}{5} + 1$

90. Find the solution of $\frac{d^2y}{dx^2} - 16y = 0$.

A $y = (c_1 + c_2)e^{-4x}$

B $y = (c_1 + c_2)e^{4x}$

C $y = c_1 e^{4x} - c_2 e^{-2x}$

D $y = c_1 e^{4x} + c_2 e^{-4x}$

91. Find the solution of $\frac{dy}{dx} + y \sec x = \tan x$.

A $y(\sec x + \tan x) = \sec x + \tan x - x + c$

B $y \tan x = \sec x + x + c$

C $y(\cos ex + \cot x) = \cos ex + \cot x - x + c$

D $y \ln \sec x = \tan x + c$

92. Stokes' theorem connects

A a surface integral and a volume integral

B a line integral and a volume integral

C a line integral and a surface integral

D gradient of a function and its surface integral

93. Evaluate $\int_c (y - \sin x)dx + (\cos x)dy$ where c is the triangle enclosed by the lines

$y = 0, x = \pi/2$ and $y = \frac{2}{\pi}x$.

A $\pi^2/2$

B $-\frac{\pi}{4} - \frac{2}{\pi}$

C $\frac{\pi}{2} + \frac{2}{\pi}$

D $\frac{2}{3}\pi^2 - 4\pi$

94. What is the value of $\int_1^2 \frac{\ln x}{x^2} dx$?

- A $\frac{1}{2} \ln(e/2)$ B $\ln e$
 C $\frac{1}{2} \ln 2$ D $\ln 2e$
95. Discuss the verification of Lagrange's mean value theorem for $f(x) = 2 \sin x + \sin 2x$ on $[0, \pi]$.
 A Not applicable B Applicable for $c = \pm \pi/3$
 C Applicable for $c = -\pi/3$ D Applicable for $c = \pi/3$
96. What is the value of $\lim_{x \rightarrow 0} \frac{1 - \cos 2x}{x}$?
 A 2 B 1
 C 0 D $1/2$
97. Solution for the system defined by the set of equations $4y + 3z = 8$, $2x - z = 2$ and $3x + 2y = 5$ is
 A $x = 0, y = 1/2, z = 2$ B $x = 0, y = 1, z = 4/3$
 C $x = 1, y = 1/2, z = 2$ D non-existent
98. If $A = \begin{bmatrix} 1 & 0 & -1 \\ 2 & 1 & -1 \\ 2 & 3 & 2 \end{bmatrix}$ then top row of A^{-1} is
 A $[2, 0, -1]$ B $[5, -3, 1]$
 C $[5, 6, 4]$ D None of these.
99. What is the eigenvector of the matrix $A = \begin{bmatrix} 5 & -4 \\ -1 & 2 \end{bmatrix}$?
 A $\begin{bmatrix} 2 \\ 2 \end{bmatrix}$ B $\begin{bmatrix} 1 \\ 2 \end{bmatrix}$
 C $\begin{bmatrix} -2 \\ -1 \end{bmatrix}$ D $\begin{bmatrix} 1 \\ 0 \end{bmatrix}$
100. If $A = \begin{bmatrix} 1 & 3 & -1 \\ 3 & 2 & 7 \\ 4 & 0 & 1 \end{bmatrix}$ then what is the first row of A^T ?
 A $[1, 2, 1]$ B $[1, 3, -1]$
 C $[1, 3, 4]$ D None of these.