Q-1 What is the unit of impedance?

A **Ohm**
B Henry
C Farad
D Siemens

Correct Answer : A

Q-2 Which theorem states that a linear two-terminal network can be replaced by an equivalent circuit with a voltage source and a series resistance?

A Norton's theorem
B **Thevenin's theorem**
C Maximum power transfer theorem
D Superposition theorem

Correct Answer : B

Q-3 In an AC circuit, the power factor is given by:

A sin(θ)
B **cos(θ)**
C tan(θ)
D None of these

Correct Answer : B

Q-4 The Laplace transform of a unit step function is:

A **1/s**
B s
C $1/s^2$
D None of these

Correct Answer : A

Q-5 A parallel RLC circuit at resonance behaves as:

A **A pure resistor**
B A pure inductor
C A pure capacitor
D A short circuit

Correct Answer : A

Q-6 A 10V DC voltage source is connected to a 10Ω resistor. What is the power dissipated in the resistor?

A **10W**
B 5W
C 15W
D 20W

Correct Answer : A

Q-7 The majority charge carriers in an N-type semiconductor are:

A Holes
B **Electrons**
C Ions
D None of these

Correct Answer : B

Q-8 The function of a Zener diode in a circuit is:

A Rectification
B Amplification

C **Voltage regulation** D Oscillation

Correct Answer : C

Q-9 A 1mH inductor and 1μF capacitor are connected in parallel. Find the resonant frequency.

A **5.03 kHz** B 10 kHz

C 1 kHz D 500 Hz

Correct Answer : A

Q-10 The primary function of a clipper circuit is to:

A Amplify signals B Suppress noise

C **Limit voltage** D None of these

Correct Answer : C

Q-11 The gain of an inverting op-amp is given by:

A R_f/R_{in} **B** $-R_f/R_{in}$

C R_{in}/R_f D $-R_{in}/R_f$

Correct Answer : B

Q-12 A Schmitt trigger is used to:

A **Convert analog signals to digital** B Increase gain

C Reduce power consumption D None of these

Correct Answer : A

Q-13 A 555 timer in astable mode generates:

A **Square wave** B Triangular wave

C Sine wave D None of these

Correct Answer : A

Q-14 The Fourier Transform of a delta function is:

A **Constant** B Sine wave

C Cosine wave D Exponential function

Correct Answer : A

Q-15 The z-transform is used for:

A Continuous-time systems **B** **Discrete-time systems**

C Analog filters D None of these

Correct Answer : B

Q-16 If an RLC circuit has R = 5Ω, L = 2H, and C = 0.5F, determine the damping factor.

A **1.58 s^{-1}** B 2.5 s^{-1}

C 0.5 s^{-1} D 3 s^{-1}

Correct Answer : A

Q-17 Which of the following amplifiers has the highest input impedance?

A Common base

B Common collector

C Common emitter

D Cascode

Correct Answer : B

Q-18 The Barkhausen criterion is used to determine:

A Amplifier stability

B Oscillator operation

C Filter design

D Feedback gain

Correct Answer : B

Q-19 In a MOSFET, the threshold voltage is the voltage required to:

A Turn off the MOSFET

B Initiate conduction

C Saturate the MOSFET

D None of these

Correct Answer : B

Q-20 A system is said to be stable if:

A Its output is bounded for bounded input

B It oscillates indefinitely

C It has negative feedback

D Its poles are in the right half-plane

Correct Answer : A

Q-21 Which transform is used to analyze discrete-time signals?

A Laplace Transform

B Fourier Transform

C Z-Transform

D None of these

Correct Answer : C

Q-22 In a transmission line, the characteristic impedance depends on:

A Resistance and capacitance

B Inductance and capacitance

C Conductance and resistance

D None of these

Correct Answer : B

Q-23 For a signal sampled at 10 kHz, what is the Nyquist frequency?

A 5 kHz

B 10 kHz

C 20 kHz

D 15 kHz

Correct Answer : A

Q-24 What is the purpose of a high-pass filter?

A Allow low frequencies

B Allow high frequencies

C Block all frequencies

D None of these

Correct Answer : B

Q-25 A sinusoidal oscillator produces:

A Square wave

B Triangular wave

C Sine wave

D Sawtooth wave

Correct Answer : C

Q-26 For a Hertzian dipole, the far-field electric field varies as:

A 1/r

B $1/r^2$

C $1/r^3$

D Constant with distance

Correct Answer : A

Q-27 In a Smith chart, the normalized impedance and its corresponding normalized admittance are

A 0° out of phase

B 180° out of phase

C 90° out of phase

D 270° out of phase

Correct Answer : B

Q-28 On a lossless transmission line, a quarter-wavelength (λ/4) transformer is used to match a load impedance of 100 Ω to a characteristic impedance of 50 Ω. The required impedance of the transformer section is:

A 50 Ω

B 25 Ω

C 70.7 Ω

D 100 Ω

Correct Answer : C

Q-29 In a two-wire transmission line in air, the adjacent voltage minimum are at 2.7 and 17.7 cm. The operating frequency is

A 2 GHz

B 1 GHz

C 500 MHz

D 4 GHz

Correct Answer : B

Q-30 If the probability density function (PDF) of a random variable X is given by

$$f_X(x)=e^{-x}, \quad x\geq 0$$

then the expected value E[X] is:

A 0

B 0.5

C 1

D 2

Correct Answer : C

Q-31 In a super heterodyne receiver, the purpose of the intermediate frequency (IF) stage is to:

A Convert RF signals to lower frequency for easier processing

B Amplify the signal before demodulation

C Remove noise from the signal

D Increase the bandwidth of the signal

Correct Answer : A

Q-32 In CDMA, each user is assigned a unique:

A Frequency band

B Time slot

C **Code sequence**

D Amplitude level

Correct Answer : C

Q-33 Which logic family has the highest speed of operation?

A TTL

B CMOS

C DTL

D ECL

Correct Answer : D

Q-34 How many selection lines are required for a 16:1 multiplexer?

A 2

B 3

C 4

D 5

Correct Answer : C

Q-35 The resolution of a 4-bit DAC with a reference voltage of 5V is:

A 0.125V

B 0.3125V

C 0.5V

D 1V

Correct Answer : B

Q-36 Which type of ROM allows multiple reprogramming?

A Mask ROM

B PROM

C EPROM

D Flash Memory

Correct Answer : D

Q-37 The 8085 microprocessor has …. general-purpose registers

A 2

B 4

C 6

D 8

Correct Answer : C

Q-38 The INX instruction in 8085 performs:

A Increment memory location

B Increment register content

C Increment register pair

D Increment accumulator

Correct Answer : C

Q-39 For a unity feedback system with an open-loop transfer function:
G(s)=K/s(s+2)(s+4)
What is the number of branches in the root locus?

A 1

B 2

C 3

D 4

Correct Answer : C

Q-40 Which of the following effects is introduced by the integral term in a PID controller?

A Increases system damping

B Reduces steady-state error

C Increases transient overshoot

D Reduces system gain

Correct Answer : B

Q-41 A system is represented in state-space as:

$$\dot{x} = Ax + Bu, \quad y = Cx + Du$$

If matrix **A** has at least one eigenvalue with a positive real part, the system is:

A Stable

B Marginally stable

C Unstable

D Cannot be determined

Correct Answer : C

Q-42 A 4-bit ripple counter is operating at a clock frequency of 16 MHz. What is the frequency of the output at the most significant bit (MSB)?

A 1 MHz

B 2 MHz

C 4 MHz

D 8 MHz

Correct Answer : A

Q-43 In a BPSK system, the bit error rate (BER) is given by

$$Q\left(\sqrt{\frac{2E_b}{N_0}}\right)$$

If the E_b/N_0 is increased by 6 dB, how does the BER change?

A It decreases by a factor of 2

B It decreases by a factor of 4

C It decreases by a factor of 10

D It decreases by a factor of 100

Correct Answer : B

Q-44 In an FM system, the SNR at the output is 20 dB. If the modulation index is doubled, what is the new SNR?

A 23 dB

B 26 dB

C 29 dB

D 32 dB

Correct Answer : B

Q-45 A system has a transfer function
G(s)H(s)=10/s(s+1)(s+3)
The Nyquist plot encircles the point −1+j0 once in the clockwise direction. What is the number of unstable poles?

A 0

B 1

C 2

D 3

Correct Answer : B

Q-46 A dipole antenna has a gain of 2.15 dBi. If the input power is 10 W, what is the effective radiated power (ERP)?

A 10 W

B 15 W

C 20 W

D 25 W

Correct Answer : C

Q-47 A second order system has unity negative feedback and open loop transfer function.

$$G(S) = \frac{500}{s(s+15)}$$

if input is ramp of 0.5 rad/sec, calculate steady state error.

A **0.015**
B 0.79
C 0.23
D 0.99

Correct Answer : A

Q-48 In a transmission line, the reflection coefficient at the load end is given by 0.25∠-27°. What is the reflection coefficient at a distance 0.15λ towards the source?

A **0.25∠81°**
B 0.25∠135°
C 0.25∠-81°
D 0.25∠225°

Correct Answer : A

Q-49 To reduce the cross-sectional area, the shape chosen for a waveguide is

A rectangular
B circular
C **ridge**
D elliptical

Correct Answer : C

Q-50 The open loop transfer function of a unity feedback control system is given by

$$G(S) = \frac{K}{s(sT+1)}$$

By what factor the amplifier gain K should be multiplied so that the damping ratio is increased from 0.2 to 0.8.

A **1/16**
B 1/8
C 1/4
D 1/2

Correct Answer : A

Q-51 An amount is invested at 10% per annum compound interest for 2 years, and the interest earned is Rs. 840. What is the principal amount?

A Rs. 3500
B Rs. 4500
C **Rs. 4000**
D Rs. 5000

Correct Answer : C

Q-52 In covering a distance of 30 km, A takes 2 hours more than B. If A doubles his speed, then he would take 1 hour less than B. A's speed is:

A **5 km/h**

B 7 km/h

C 9 km/h

D 10 km/h

Correct Answer : A

Q-53 Fill the blank in the middle of the following series.
SCD, TEF, UGH, _____, WKL

A CMN

B UJI

C VIJ

D IJT

Correct Answer : C

Q-54 The Chandrayaan 3 mission's rover is known as

A PSLV

B Pragyaan

C Dhruv

D Vikram

Correct Answer : B

Q-55 We were very tired, So we _____ early.

A Leave

B Leaving

C Left

D Lost

Correct Answer : C

Q-56 Consider the system of linear equations

$$x+2y-3z=-2,$$
$$3x-y+4z=3,$$
$$6x+5y+\lambda z=-3$$

where x,y,z are the variables and λ is a constant. Then which one of the following is true ?

A If λ=5, then system has unique solution

B If λ=5, then system has infinitely many solutions

C If λ=5, then system has no solution

D System is inconsistence for any value of λ

Correct Answer : B

Q-57 Evaluate double integral $\int_0^\infty \int_x^\infty \frac{e^{-y}}{y} dy\, dx.$

A 0

B 1

C -2

D 2

Correct Answer : B

Q-58 Using Newton's iterative method with initial approximation $x_0 = 2$, the root of the equation $x^3 - 2x - 8 = 0$ after one iteration is

A 2.40

B 2.33

C 2.12

D 2.50

Correct Answer : A

Q-59 Find the directional derivative of $F(x, y, z) = x^2yz + 4xz^2$ at $(1, -2, -1)$ in the direction of vector $2\hat{\imath} - \hat{\jmath} - 2\hat{k}$.

A 31/3

B 35/3

C 37/3

D 38/3

Correct Answer : C

Q-60 The general solution of the first order differential equation $\frac{dy}{dx} + 2y \tan x = \sin x$ is

A $y = \sin x + k \cos^2 x$

B $y = \sin x + k \sin^2 x$

C $y = \cos x + k \sin^2 x$

D $y = \cos x + k \cos^2 x$

Correct Answer : D