Sr. No. ....2010........

ENTRANCE TEST-2024

2-Year M Tech Programme
Electronics & Communication Engineering

Total Questions : 60

Time Allowed : 70 Minutes

Roll No. | | | | | |

1. Write your roll number in the space provided at the top of this page of question booklet and fill up the necessary information in the spaces provided on OMR Answer sheet.

2. OMR Answer sheet has an original copy and a candidate's copy glued beneath it at the top. While making entries in the original copy, candidate should ensure that the two copies are aligned properly so that the entries made in the original copy against each item are exactly copied in the candidate's copy.

3. All entries in the OMR answers sheet including answers to questions are to be recorded in the original/Carbon copy.

4. Use only blue/ black ball point pen to darken the circle of correct / most appropriate response. In no case gel/ ink pen or pencil should be used.

5. <u>Do not darken more the one circle of option for any question. A question with more than one darkened response shall be considered wrong.</u>

6. <u>There will be negative marking for wrong answers. Each wrong answer will lead to the deduction of 0.25 marks from the total score of the candidate.</u>

7. Only those candidates who would obtain positive score in entrance test examination shall be eligible for admission.

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14. If any of the information in the response Sheet/Question Paper has been found missing or not mentioned as stated above the candidate is solely responsible for that lapse.

SEAL

M.Tech {Electronics and Communication Engineering }

1. For an operational amplifier with a closed-loop gain of 10, an open-loop gain of 100,000, and an input signal of 1 mV, what is the approximate error voltage at the input?

    a) 0.1 µV
    b) 1 µV
    c) 10 µV
    d) 100 µV

2. In a differential amplifier, if the differential input voltage is zero, the output voltage is ideally:
    a) Equal to the common-mode voltage
    b) Zero
    c) Equal to the power supply voltage
    d) Undefined

3. Which of the following topologies is least sensitive to transistor parameter variations in analog integrated circuits?
    a) Current mirror
    b) Cascode amplifier
    c) Differential amplifier
    d) Common-emitter amplifier

4. The Early effect in a BJT transistor refers to:
    a) The reduction in base current with an increase in collector voltage
    b) The modulation of the base-width by the collector voltage
    c) The increase in emitter current with base voltage
    d) The reduction in emitter-base voltage with increase in base current

5. A small signal model of a BJT in common-emitter configuration typically includes:
    a) Only the base resistance
    b) Only the collector resistance
    c) Base resistance, collector resistance, and transconductance
    d) Emitter resistance, collector resistance, and transconductance

6. In a MOSFET, the channel length modulation is a phenomenon analogous to:
    a) Early effect in BJTs
    b) Punch-through effect
    c) Hot carrier injection
    d) Threshold voltage roll-off

7. A Wein bridge oscillator typically operates at:

    a) High frequencies
    b) Low frequencies
    c) Radio frequencies
    d) Audio frequencies

8. The bandwidth of a single-stage RC coupled amplifier is limited by:

    a) Coupling capacitor and bypass capacitor
    b) Coupling capacitor and load resistor
    c) Bypass capacitor and emitter resistor
    d) Load resistor and transistor capacitances

9. Which of the following is a key advantage of using negative feedback in an amplifier circuit?

    a) Increased gain
    b) Reduced bandwidth
    c) Improved linearity
    d) Increased input impedance only

10. A Miller effect capacitance in an amplifier is given by:

    a) The sum of input and output capacitances
    b) The product of input capacitance and gain
    c) The product of output capacitance and gain
    d) Input capacitance multiplied by (1 - gain)

11. Which of the following is true for a synchronous counter over an asynchronous counter?

    a) It is faster due to simultaneous triggering of flip-flops
    b) It consumes more power
    c) It requires more flip-flops
    d) It is less complex to design

12. In a CMOS inverter, the transition region of the output occurs when:

    a) The input voltage is low
    b) The input voltage is high
    c) The input voltage is approximately at the threshold voltage
    d) The input voltage is zero

13. Which logic family offers the highest noise margin?

    a) TTL
    b) ECL
    c) CMOS
    d) DTL.

28. Which of the following statements about CDMA (Code Division Multiple Access) is true?

        a) Each user is assigned a unique frequency
        b) Users share the same frequency band using time slots
        c) Users share the same frequency band but use unique codes
        d) Each user is assigned a unique time slot

29. The Nyquist theorem states that the minimum sampling rate to avoid aliasing is:

        a) Equal to the signal bandwidth
        b) Twice the highest frequency present in the signal
        c) Half the signal bandwidth
        d) Twice the carrier frequency

30. Which of the following describes a guard band?

        a) A band used for error correction
        b) A frequency range used to separate two channels
        c) A range of frequencies used for synchronization
        d) A band allocated for emergency communication

31. In a network, the MAC (Media Access Control) address is used to:

        a) Identify the network layer protocol
        b) Identify the physical device in the network
        c) Identify the application layer protocol
        d) Identify the transport layer protocol

32. Which of the following protocols is used for secure communication over a computer network?

        a) HTTP
        b) FTP
        c) HTTPS
        d) Telnet

33. In IPv4 addressing, what is the maximum number of IP addresses that can be assigned in a Class C network?

        a) 254
        b) 256
        c) 1024
        d) 65,536

34. The primary purpose of the Transport layer in the OSI model is to:

    a) Ensure reliable data transmission
    b) Manage network topology
    c) Provide logical addressing
    d) Route data between networks

35. Which of the following best describes the function of a router in a network?

    a) It connects devices within the same network
    b) It forwards data packets between different networks
    c) It provides IP addresses to devices
    d) It amplifies signals for long-distance communication

36. In Ethernet, the term "collision domain" refers to:

    a) A network segment where data collisions occur
    b) A range of frequencies allocated for communication
    c) A group of devices that share the same broadcast address
    d) A network segment where data is encrypted

37. Which of the following describes the purpose of a subnet mask in an IP network?

    a) To encrypt data packets
    b) To divide an IP address into network and host portions
    c) To assign IP addresses dynamically
    d) To identify the default gateway

38. In a TCP/IP network, the purpose of the ARP (Address Resolution Protocol) is to:

    a) Map a domain name to an IP address
    b) Map an IP address to a MAC address
    c) Establish a connection between two IP hosts
    d) Route data between different networks.

39. Which of the following best describes the difference between a hub and a switch?

    a) A hub connects devices using IP addresses; a switch uses MAC addresses
    b) A hub broadcasts data to all ports; a switch sends data to the specific port
    c) A hub operates at the network layer; a switch operates at the transport layer
    d) A hub uses full-duplex communication; a switch uses half-duplex communication

40. In a TCP/IP network, the three-way handshake is used for:

   a) Establishing a secure connection
   b) Terminating a connection
   c) Synchronizing clocks between hosts
   d) Establishing a reliable connection

41. In a microprocessor, the control unit is responsible for:

   a) Performing arithmetic and logic operations
   b) Controlling the flow of data and instructions
   c) Storing data temporarily
   d) Generating clock signals

42. Which of the following addressing modes is used in the instruction "MOV AX, [BX]"?

   a) Immediate addressing
   b) Direct addressing
   c) Register addressing
   d) Indirect addressing

43. The term "pipelining" in CPU architecture refers to:

   a) Executing multiple instructions simultaneously
   b) Storing data in a queue for processing
   c) Executing different stages of multiple instructions concurrently
   d) Increasing the clock speed of the CPU

44. The primary function of the ALU (Arithmetic Logic Unit) in a microprocessor is to:

   a) Control input and output operations
   b) Manage memory access
   c) Perform arithmetic and logic operations
   d) Decode instructions

45. In a microprocessor, which of the following is an example of a "control hazard"?

   a) Incorrect instruction execution due to branch prediction failure
   b) Delay in accessing memory
   c) Data dependency between instructions
   d) Cache miss during instruction fetch

46. Cache memory in a CPU is typically implemented using:

    a) DRAM
    b) SRAM
    c) EEPROM
    d) Flash memory

47. In a microprocessor, the stack pointer (SP) is typically used to:

    a) Point to the next instruction to be executed
    b) Point to the top of the stack in memory
    c) Point to the base of the current stack frame
    d) Hold the address of the current instruction

48. In a microprocessor, what is the purpose of a "program counter" (PC)?

    a) To store the address of the next instruction to be executed
    b) To store the current status of the ALU
    c) To count the number of instructions executed
    d) To store the base address of the stack.

49. In a RISC (Reduced Instruction Set Computing) architecture, instructions typically:

    a) Are complex and variable in length
    b) Execute in multiple cycles
    c) Have a large number of addressing modes
    d) Execute in a single clock cycle

50. Which of the following is a characteristic of Von Neumann architecture?

    a) Separate memory for data and instructions
    b) Unified memory for data and instructions
    c) Parallel execution of instructions
    d) Complex instruction set

51. The Z-transform of a discrete-time signal is defined as:

    a) The continuous Fourier transform of the signal
    b) The discrete Fourier transform of the signal
    c) The Laplace transform of the sampled signal
    d) The power series representation of the signal

52. In the context of signals, which of the following is true for a causal system?

a) The output depends only on past and present inputs
b) The output depends on past, present, and future inputs
c) The output is independent of the input
d) The output depends only on future inputs

53. The Fourier transform of a signal provides information about:

a) The time-domain representation of the signal
b) The amplitude of the signal at a given time
c) The frequency content of the signal
d) The phase shift of the signal

54. The Nyquist criterion for sampling states that:

a) The sampling frequency should be twice the highest frequency component of
the signal
b) The sampling frequency should be equal to the highest frequency component
of the signal
c) The sampling frequency should be half the highest frequency component of
the signal
d) The sampling frequency should be thrice the highest frequency component of
the signal

55. In a linear time-invariant (LTI) system, the convolution of the input signal with the
impulse response gives:

a) The system's transfer function
b) The system's output
c) The system's frequency response
d) The system's phase response

56. Which of the following properties is true for the Discrete Fourier Transform (DFT)?

a) It is continuous and periodic
b) It is discrete and aperiodic
c) It is continuous and aperiodic
d) It is discrete and periodic

57. The Laplace transform is primarily used for:

    a) Analyzing the time-domain behavior of signals
    b) Solving differential equations
    c) Designing digital filters
    d) Converting analog signals to digital

58. In DSP, a finite impulse response (FIR) filter is characterized by:

    a) An infinite duration of impulse response
    b) A non-recursive structure
    c) Feedback in its structure
    d) An all-pass frequency response

59. The group delay of a system is defined as:

    a) The delay of a specific frequency component
    b) The total delay introduced by the system
    c) The derivative of the phase response with respect to frequency
    d) The delay of the impulse response

60. Which of the following windows has the highest main lobe width and lowest side lobe level in spectral analysis?

    a) Rectangular window
    b) Hamming window
    c) Hanning window
    d) Blackman window

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ENTRANCE TEST-2019

000418

SCHOOL OF ENGINEERING

M.TECH. IN ELECTRONICS ENGINEERING

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Question Booklet Series **B**

Time Allowed   : 70 Minutes

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1. Patch is a
   a) High gain wide band antenna
   b) High gain narrow band antenna
   c) Low gain narrow band antenna
   d) Low gain wide band antenna

2. In the Op-Amp circuit shown, assume that the diode current follows the equation $I = I_S \exp(V/V_T)$. For $V_i = 2V$, $V_o = V_{o1}$ and for $V_i = 4V$, $V_o = V_{o2}$. The relationship between V_{o1} and V_{o2} is:
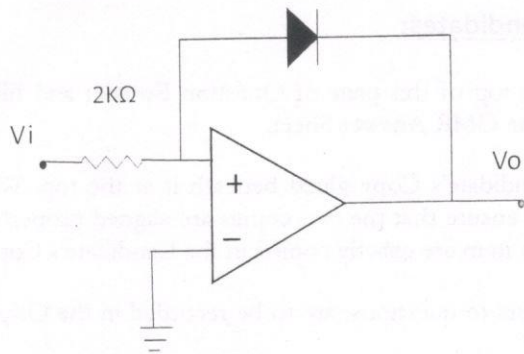
   a) $V_{o2} = \sqrt{2}V_{o1}$
   b) $V_{o2} = e^2 V_{o1}$
   c) $V_{o2} = V_{o1} \ln 2$
   d) $V_{o1} - V_{o2} = VT \ln 2$

3. An 8085-assembly language program is given below.

   ```
   MVI A, B5H
   MVI B, 0EH
   XRI 69H
   ADD B
   ANI 9BH
   CPI 9FH
   7: STA 3010H
   8: HLT
   ```

   The contents of the accumulator just after execution of the ADD instruction will be
   a) C3H
   b) EAH
   c) DCH
   d) 69H

4. The Boolean function Y= AB+CD to be realized using only 2 input NAND gates. The minimum number of gates required is
   a) 2
   b) 3
   c) 4
   d) 5

5. For Hertzian dipole antenna, the half power beam width (HPBW) in the E-Plane is
   a) $360°$
   b) $180°$
   c) $90°$
   d) $45°$

6. The ability of a receiver to discriminate against the interfering signals is known as
   a) Selectivity
   b) Sensitivity
   c) Fidelity
   d) Distortion

7. In an electric circuit, 4 resistances each of 10 ohm are connected in parallel. What is the value of the equivalent conductance of the circuit?
   a) 40
   b) 0.4
   c) 10
   d) 0.1

8. The DC-current gain (β) of a BJT is 50. Assuming that the emitter injection efficiency is 0.995, the base transport factor is:
   a) 0.980
   b) 0.985
   c) 0.990
   d) 0.995

9. A Hilbert transform is a
   a) non-linear system
   b) non casual system
   c) time varying system
   d) low pass system

10. An LED made of GaAs operates at a wavelength of 0.86 um. The surrounding medium is air. The relative permittivity of GaAs is 12.9. The external quantum efficiency of the LED is
    a) 2.31%
    b) 23.1%
    c) 13.1%
    d) 1.31%

11. The drain current of a MOSFET in saturation is given by $I_D = K \, (V_{GS} - V_T)^2$ where K is a constant. The magnitude of the transconductance g_m is

a) $\dfrac{K(V_{GS} - V_T)^2}{V_{DS}}$

b) $2 \, K \, (V_{GS} - V_T)$

c) $\dfrac{I_D}{V_{GS} - V_{DS}}$

d) $\dfrac{K(V_{GS} - V_T)^2}{V_{GS}}$

12. A uniform plane wave in the free space is normally incident on an infinitely thick dielectric slab (dielectric constant $\varepsilon_r = 9$). The magnitude of the reflection coefficient is

a) 0

b) 0.3

c) 0.5

d) 0.8

13. A rectangular waveguide of internal dimensions (a = 4 cm and b = 3 cm) is to be operated in TE_{11} mode. The minimum operating frequency is

a) 6.25 GHz

b) 6.0 GHz

c) 5.0 GHz

d) 3.75 GHz

14. The amplitude of a random signal is uniformly distributed between -5 V and 5 V. If the Signal to Quantization noise ratio required in uniformly quantizing the signal is 43.5 dB, the step size of the quantization is approximately

a) 0.0333 V

b) 0.05 V

c) 0.0667 V

d) 0.10 V

15. The full form of the abbreviations TTL and CMOS in reference to logic families is

a) Triple Transistor Logic and Chip Metal Oxide Semiconductor

b) Tristate Transistor Logic and Chip Metal Oxide Semiconductor

c) Transistor Transistor Logic and Complementary Metal Oxide Semiconductor

d) Tristate Transistor Logic and Complementary Metal Oxide Semiconductor

16. The unit step response of a system starting from rest is given by
$$c(t) = 1 - e^{-2t} \text{ for } t \geq 0$$
The transfer function of the system is:

a) $\dfrac{1}{1+2s}$

b) $\dfrac{2}{2+s}$

c) $\dfrac{s}{2+s}$

d) $\dfrac{2s}{1+2s}$

17. What is the percent of modulation of an AM wave whose total power is 3.3KW and each sideband contains 400W?

a) 80%

b) 97%

c) 50%

d) 66.6%

18. What is the resistance when the length and area of a cross section of a wire are doubled assuming the initial resistance of the wire is R ohms?

a) 2R

b) R

c) 4R

d) R/2

19. In digital electronics, Darlington pair or connection in two transistors is created by

a) Disconnecting both collectors

b) Connecting both collectors

c) Disconnecting both emitters

d) Connecting both emitters

20. Choose the incorrect statement with respect to SCR from the following

a) It is a bidirectional device

b) It has better power handling capacity than simple BJTs

c) It is triggered by a Gate signal

d) It can be used for high power or industrial applications

21. Which among the following is a new high conductance MOS gate-controlled power switch?
    a) BJT
    b) Diode
    c) IGBT
    d) SCR

22. Which slope is represented by $1/j\omega$ in transfer function in Bode diagram corresponding to log magnitude plot?
    a) - 50 dB/decade
    b) -2 dB/decade
    c) -20 dB/decade
    d) -5 dB/decade

23. A negative feedback closed loop system is supplied an input of 10V. The system has forward gain of 1. What is the output voltage? (Given $\beta = 1$)
    a) 5 V
    b) 10 V
    c) 2.5 V
    d) 20 V

24. What is the purpose of providing a fuse in an electric circuit?
    a) To safeguard the installation against heavy current
    b) To reduce the current flowing in the circuit
    c) To reduce the power consumption
    d) To improve the power factor

25. A reflex klystron functions as
    a) microwave amplifier
    b) microwave oscillators
    c) microwave amplifier and oscillator
    d) high gain cavity

26. Which of the following is minimized by laminating the core of a transformer?
    a) Eddy current loss
    b) Hysteresis loss
    c) Heat loss
    d) Copper loss

27. Mobility is defined as
    a) Diffusion velocity per unit field
    b) Drift velocity per unit field
    c) Displacement per unit field
    d) Number of free electrons / Number of bound electrons

28. The ideal voltage gain of voltage amplifier is
   a) 1
    b) < 1
    c) 0
    d) infinity

29. An independent voltage source in series with an impedance $Z_s = R_s - jX_s$ delivers a maximum average power to a load impedance Z_L when

    a) $Z_L = R_s + jX_s$
    b) $Z_L = R_s$
    c) $Z_L = jX_s$
    d) $Z_L = R_s - jX_s$

30. Two discrete time systems with impulse responses $h_1[n] = \delta[n-1]$ and $h_2[n] = \delta[n-2]$ are connected in cascade. The overall impulse response system of the cascaded system is
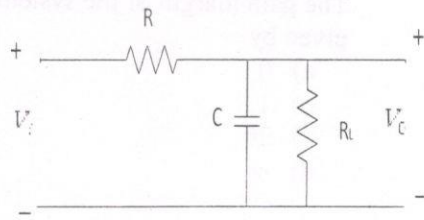   a) $\delta[n-1] + \delta[n-2]$
    b) $\delta[n-4]$
    c) $\delta[n-3]$
   d) $\delta[n-1] \, \delta[n-2]$

31. The current shown in the circuit is
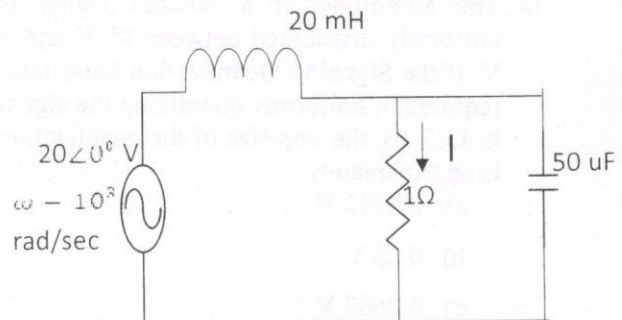
    a) -j1 A
    b) j1 A
    c) 0 A
    d) 20 A

32. If the transfer function of the following network is $\frac{V_0(s)}{V_i(s)} = \frac{1}{2+sCR}$, the value of the load resistance R_L is

   a) R/4
   b) R/2
   c) R
   d) 2R

33. An intrinsic semiconductor at the absolute zero of the temperature
   a) behaves like a metallic conductor
   b) has a large number of conductors
   c) behaves like an insulator
   d) has a large number of holes

34. The superposition principle is essentially based on the concept of
   a) non-linearity
   b) reciprocity
   c) duality
   d) linearity

35. A bistable multivibrator that functions as a voltage comparator with hysteresis is called
   a) JK Flip Flop
   b) T Flip Flop
   c) D Flip Flop
   d) Schmitt trigger

36. The logic circuit realized by the circuit shown in the given figure will be
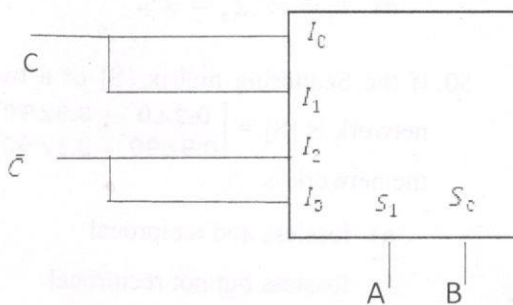
   a) B$\oplus$C
   b) A$\oplus$C
   c) A$\odot$B$\odot$C
   d) A$\ominus$B

37. What are the minimum number of 2 to 1 multiplexers to generate a 2-input AND gate and a 2-input Ex-OR gate?
   a) 1 and 2
   b) 1 and 3
   c) 1 and 1
   d) 2 and 2

38. A continuous time LTI system is described by
$$\frac{d^2y(t)}{dt^2} + 4\frac{dy(t)}{dt} + 3\,y(t) = 2\frac{dx(t)}{dt} + 4\,x(t)$$
Assuming zero initial conditions, the response $y(t)$ of the above system for the input $x(t) = e^{2t}\,u(t)$ is given by
   a) $(e^t - e^{3t})\,u(t)$
   b) $(e^{-t} - e^{-3t})\,u(t)$
   c) $(e^{-t} + e^{-3t})\,u(t)$
   d) $(e^t + e^{3t})\,u(t)$

39. Group I lists four different semiconductor devices. Match each device in group I with its characteristic property in Group II
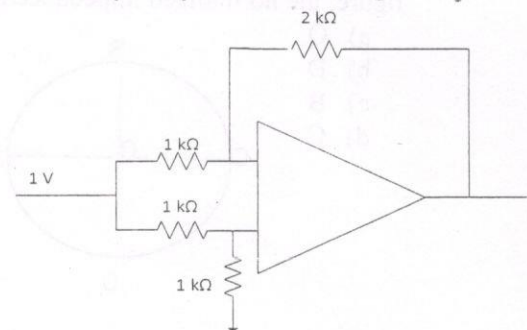
Group I	Group II
(P) BJT	(1) Population inversion
(Q) MOS Capacitor	(2) Pinch off Voltage
(R) LASER diode	(3) Early effect
(S) JFET	(4) Flat band Voltage

   a) P-3 Q-1 R-4 S-2
   b) P-1 Q-4 R-3 S-2
   c) P-3 Q-4 R-1 S-2
   d) P-3 Q-2 R-4 S-4

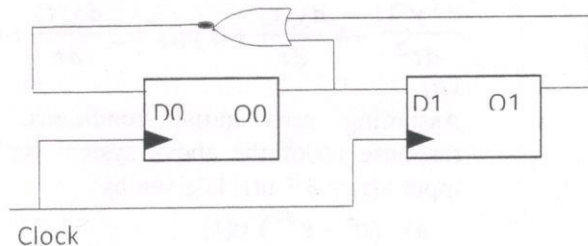40. For the Op-Amp circuit in the figure, V_0 is :

   a) -2 V
   b) -1 V
   c) -0.5 V
   d) 0.5 V

41. The Nyquist sampling rate for the signal
$s(t) = \dfrac{\sin(500\pi t)}{\pi t} \times \dfrac{\sin(700\pi t)}{\pi t}$ is given by
   a) 400 Hz
   b) 600 Hz
   c) 1200 Hz
   d) 1400 Hz

42. For the circuit shown, the counter state $(Q_1 Q_0)$ follows the sequence
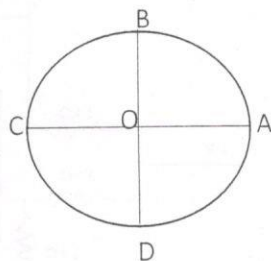

Clock

   a) 00,01,10,11,00
   b) 00,01,10,00,01
   c) 00,01,11,00,01
   d) 00,10,11,00,10

43. An air filled rectangular waveguide has inner dimension of 3 cm × 2 cm. The wave impedance of the TE_{20} mode of propagation in the waveguide at a frequency of 30 GHz is (free space impedance $\eta_0 = 377\Omega$)

   a) 308 Ω
   b) 355 Ω
   c) 400 Ω
   d) 461 Ω

44. In the outline of the Smith Chart in the figure, the normalized impedance is
   a) O
   b) D
   c) B
   d) C

45. In delta modulation, the slope distortion can be reduced by
   a) decreasing the step size
   b) decreasing the granular noise
   c) decreasing the sampling rate
   d) Increasing the step size

46. The open loop transfer function of a unity gain feedback control system is given by
$$G(s) = \dfrac{K}{(s+1)(s+2)}$$
The gain margin of the system in dB is given by
   a) 0
   b) 1
   c) 20
   d) ∞

47. For transistor action
   a) the base region must be thin and lightly doped
   b) the base, emitter and collector regions should have similar size and doping concentrations
   c) the collector base junction is forward biased
   d) the collector region must be more heavily doped than the emitter region

48. The output of a logic gate is '1' when all the inputs are at logic '0'. The gate is either
   a) a NAND or an EX-OR gate
   b) a NOR or an EX-OR gate
   c) an AND or an EX-NOR gate
   d) a NOR or an EX-NOR gate

49. The input impedance (Z_i) and the output impedance (Z_o) of an ideal transconductance (Voltage Controlled Current Source) amplifier are

   a) $Z_i = 0, Z_o = 0$
   b) $Z_i = 0, Z_o = \infty$
   c) $Z_i = \infty, Z_o = 0$
   d) $Z_i = \infty, Z_o = \infty$

50. If the Scattering matrix [S] of a two-port network is [S] = $\begin{bmatrix} 0.2\angle 0° & 0.9\angle 90° \\ 0.9\angle 90° & 0.1\angle 90° \end{bmatrix}$ then the network is

   a) lossless and reciprocal
   b) lossless but not reciprocal
   c) not lossless but reciprocal
   d) neither lossless nor reciprocal

51. A full duplex operation permits the transmission
   a) in both directions at different times
   b) in both the directions at the same time
   c) in only one direction at the same time
   d) in only one direction at one time

52. Light travels along the optical fibers by which mechanism
   a) Refraction
   b) Reflection
   c) Scattering
   d) Total internal reflection

53. A 5-point sequence x[n] is given as
   x[3] = 1, x[-2] = 1, x[-1] = 0, x[0] = 5, x[1] = 1.
   Let $X(e^{j\omega})$ denote the discrete -time Fourier transform of x[n]. The value of $\int_{-\pi}^{\pi} X(e^{j\omega}) \, d\omega$ is:

   a) 5
   b) $10\,\pi$
   c) $16\,\pi$
   d) $5+j10\,\pi$

54. The transfer function of a phase lead compensator is given by
   $G_c(s) = \dfrac{1+3Ts}{1+Ts}$ where T > 0
   The maximum phase shift provided by such a compensator is:
   a) $\dfrac{\pi}{2}$
   b) $\dfrac{\pi}{3}$
   c) $\dfrac{\pi}{4}$
   d) $\dfrac{\pi}{6}$

55. In digital communication system the data transmission rate is specified in
   a) MHz
   b) bits/second
   c) bytes/second
   d) bauds

56. The intrinsic impedance of a lossy dielectric medium is given by:
   a) $\dfrac{j\omega\mu}{\sigma}$
   b) $\sqrt{\dfrac{j\omega\mu}{\sigma+j\omega\varepsilon}}$
   c) $\dfrac{j\omega\varepsilon}{\mu}$
   d) $\sqrt{\dfrac{\mu}{\varepsilon}}$

57. A buck converter is:
   a) AC to DC converter
   b) AC to AC converter
   c) DC to DC converter
   d) Dc to AC converter

58. For a given JFET, the typical values of amplification factor and transconductance are given as 40 and 100 μs. The dynamic resistance of JFET will be:
   a) 200 Ω
   b) 400 Ω
   c) 200 kΩ
   d) 400 kΩ

59. A relaxation oscillator uses
   a) a PIN diode
   b) both a Tunnel diode and UJT
   c) a Tunnel diode
   d) UJT

60. If Z is the impedance of a simple dipole, the impedance of n fold dipole is given by
   a) nZ
   b) $n^2 Z$
   c) $\dfrac{Z}{n}$
   d) $\dfrac{Z}{n^2}$