Section 1 - Lect Electronics Engg

No. of Questions: 100
Duration in Minutes: 120

1) In thermo-couple instruments, in which of the following is an emf caused if the junction of two wires of dissimilar metals is heated and the free or cold ends are connected to a milli-voltmeter?

A) Kelvin effect
B) Hot wire effect
C) Seebeck effect
D) Faraday effect

2) The largest change of input quantity for which there is no output of the instrument is called as

A) Dead time of that instrument
B) Live zone of that instrument
C) Dead zone of that instrument
D) Discrimination of that instrument

3) Which of the following instruments can be used for measurement of very high value resistances such as insulation resistance in industries?

A) Wheatstone bridge
B) Megger
C) Ohm-meter
D) Resistive potentiometer

4) Which of the following materials is used in the construction of thermistors?

A) Pure metal
B) Pure semiconductor
C) Pure insulator
D) Sintered mixture of metal oxides

5) Which of the following transducers can be used for non-contact temperature measurement?

A) Resistance temperature detector
B) Thermistor
C) Sensistor
D) Pyrometer

6) For a NAND gate, when one or more inputs are low then the output will be

A) Low
B) High
C) Alternately high and low
D) High or low depending on relative magnitude of inputs

7) Which code is used in constructing k-maps?

A) Hamming code

B) 2 out of 5 code

C) BCD code

D) Gray code

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8) The current mode logic (CML) is same as

A) LSI

B) CMOS

C) TTL

D) ECL

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9) What is the 2's complement of 01101?

A) 10010

B) 10011

C) 1100

D) 1001

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10) Which one of the following logic circuit has the highest speed as compared to the currently available logic circuits?

A) Resistance-transistor logic

B) Emitter-coupled logic

C) Integrated-injection logic

D) Diode-transistor logic

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11) The output of a JK flip-flop with asynchronous preset and clear inputs is '1'. The output can be changed to '0' with one of the following conditions by applying

A) J = 0, K = 0 and using a clock

B) J = 1, K = 0 and using the clock

C) Asynchronous preset input

D) J = 1, K = 1 and using the clock

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12) The contents of EPROM can be erased by exposing it to

A) Ultraviolet rays

B) Infrared rays

C) Burst of microwaves

D) Intense heat radiations

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13) Converting $(10110110)_2$ to base 16 will result in

A) $A6_{16}$

B) $B6_{16}$

C) $C6_{16}$

D) $D6_{16}$

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14) Which one of the following is equivalent to x' ?

A) x X-OR 0
B) 1 NOR x
C) x AND x
D) x X-NOR 0

15) The following switching functions are to be implemented using a Decoder.

$$F_1 = \sum m(1,2,4,8,10,14)$$
$$F_2 = \sum m(2,5,9,11)$$
$$F_3 = \sum m(2,4,5,6,7)$$

The minimum configuration of the decoder should be

A) 2 – to – 4 line
B) 3 – to – 8 line
C) 4 – to – 16 line
D) 5 – to – 32 line

16) What is the steady state error of type-0 system for ramp input?

A) ∞
B) A/K
C) A/(1+K)
D) 0

17) What is the time response of a system whose poles lie on the right hand side of s-plane?

A) Exponentially increasing
B) Exponentially decreasing
C) Sinusoidal oscillations
D) Step response

18) What will happen to the gain margin if the gain of the open loop system is doubled?

A) Doubled
B) Becomes half
C) Is not affected
D) Becomes one-fourth

19) The effect of negative feedback on distortion and bandwidth is

A) Both distortion and bandwidth get decreased
B) Both distortion and bandwidth get increased
C) Distortion is reduced and bandwidth is increased
D) Distortion is increased and bandwidth is decreased

20) Which one of the following is another name for common-collector amplifier?

A) Source follower
B) Collector follower
C) Base follower
D) Emitter follower

21) Which of the following circuits converts any arbitrary waveform into square waveform?

A) Hartley oscillator
B) Schmitt trigger
C) Differentiator
D) RC phase shift oscillator

22) When does the Body bias effect occur in an n-channel MOSFET?

A) When the Source voltage is less the Bulk voltage
B) When the Source voltage is equal to or greater the Bulk voltage
C) When the Drain voltage is equal to the Bulk voltage
D) When the Gate voltage is equal to the Bulk Voltage

23) What is a Schmitt trigger?

A) A trigger circuit
B) A comparator with Hysteresis
C) A comparator without Hysteresis
D) Amplifier

24) What is the efficiency of Class-B amplifier?

A) 68.50%
B) 78.50%
C) 88.50%
D) 98.50%

25) A diode in which the change in reverse bias voltage varies the capacitance is called as

A) Varactor diode
B) Switching diode
C) Tunnel diode
D) Zener-diode

26) How does the cut-in voltage of diode vary with temperature?

A) Increases by $2 \text{ mV/}^{\circ}\text{C}$
B) Decreases by $2 \text{ mV/}^{\circ}\text{C}$
C) Doubles for every 10°C rise in temperature
D) Doubles for every 10°C drop in temperature

27) The unity gain bandwidth of an inverting amplifier is 10 MHz What would be the bandwidth if the gain is increased to 10 V/V?

A) 100 MHz

B) 1 MHz

C) 10 MHz

D) 1 kHz

28) An inverting operational amplifier has $R_f = 2M\Omega \; and \; R_1 = 2K\Omega$. Its scale factor is

(symbols/notations carry their usual meaning)

A) 1000

B) 100

C) -100

D) -1000

29) If the base current of a BJT is 250 µA and emitter current is 15 mA, then the common base current gain will be

A) 0.98

B) 0.41

C) 59

D) 55

30) A zener voltage regulator has load requirements of 12 V and 2 A. The zener diode minimum current requirement is 0.2 A. The minimum voltage at input is 24 V. What is the required value of series resistance with source?

A) 5.45 Ω

B) 6 Ω

C) 7.2 Ω

D) 6.38 Ω

31) An AC supply of 230 V is applied to a half-wave rectifier circuit through a transformer having primary to secondary turn's ratio 12:1. The peak inverse voltage is

A) 8.62 V

B) 12 V

C) 19.17 V

D) 27.11 V

32) Consider silicon at T = 300 K doped with phosphorus at a concentration of $N_d = 10^{16}$ cm^{-3}. The intrinsic concentration is given as $n_i = 1.5 \times 10^{10}$ cm^{-3}. Calculate the thermal equilibrium hole concentrations.

A) 2.25×10^4 cm^{-3}

B) 5×10^4 cm^{-3}

C) 25×10^4 cm^{-3}

D) 2×10^4 cm^{-3}

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33) A differential amplifier has a differential gain of 28000 and CMRR is 60 dB. What will be the value of common mode gain?

A) Ac = 0.125
B) Ac = 0.33
C) Ac = 3
D) Ac = 28

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34) The number of terminals present in IGBT is

A) 2
B) 3
C) 4
D) 5

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35) How is the GTO turned off?

A) By using a commutation circuit
B) By applying reverse gate pulse
C) By using a latch-up circuit
D) By reverse anode current pulse

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36) An inductor is connected in series with SCR to protect it from

A) Excessive high voltage
B) Excessive high dv/dt
C) Excessive high di/dt
D) Excessive large forward current

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37) Which of the following thyristors can be used for high frequency of operation?

A) TRIAC
B) DIAC
C) SCR
D) GTO

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38) The SCR would be turned OFF by voltage reversal of applied anode-cathode ac supply frequency of

A) 10 kHz
B) 10 Hz
C) 5 kHz
D) 5 Hz

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39) A certain power MOSFET has a maximum junction temperature specification of 1500° C, a junction-to-case thermal resistance of 1.00 C/W, and a junction-to ambient thermal resistance of

600 C/W. If the ambient temperature is 300° C, then the maximum allowable power dissipation in the device will be

A) 1.52 W
B) 1.72 W
C) 1.92W
D) 2.00 W

40) What is the Laplace transform of step signal of 5 units magnitude?

A) 5s
B) 5/s
C) s/5
D) 1/s

41) What is the Fourier transform of a Gaussian time pulse?

A) Uniform
B) Gaussian
C) Impulses
D) Pulse

42) What does double integration of a unit step function lead to?

A) A doublet
B) A ramp
C) An impulse
D) A parabola

43) An energy signal has G(f) = 20. Its energy density spectrum is

A) 20
B) 100
C) 400
D) 800

44) The sampling rate to avoid aliasing for the signal m(t) = 100 cos 200ωt will be

A) ≥1/25 sec
B) ≥1/50 sec
C) ≤1/25 sec
D) ≤ 1/50 sec

45) The second harmonic distortion is defined as the

A) Ratio of amplitude of second harmonic component in the output to that of the fundamental frequency
B) Harmonic distortion due to only second harmonic component
C) Sum of distortion of first and second harmonic components in the output

D)   Ratio of amplitude of fundamental component in the output to that of second harmonic component at the input

46) As per Shannon's channel capacity theorem, if samples are transmitted in 'T' seconds over a noisy channel which is bandlimited to 'B' Hz. The number of samples 'n' is given by

(symbols/notations carry their usual meaning)

A) B/T
B) T/B
C) 2BT
D) BT/2

47) What is the frequency range of VHF electromagnetic waves?

A) 30-300 kHz
B) 30-3000 kHz
C) 30-300 MHz
D) 30-3000 MHz

48) If a signal band limited to fm is sampled at a rate less than 2fm, then the constructed signal will be

A) Large in amplitude
B) Small in amplitude
C) Distorted
D) Distortion less

49) An SSB transmitter produces a peak-to-peak voltage of 200 V across a 100 Ω antenna load. What is the Peak Envelope Power?

A) 49.98 W
B) 79.98 W
C) 99.96 W
D) 199.93 W

50) What is the channel capacity of a noisy channel with conditional probability of error p = 1/2?

A) 0
B) 1
C) Infinity
D) 2

51) As per information capacity theorem, what is the capacity of channel of bandwidth 'B' Hz, perturbed by AWGN of PSD $N_0/2$, limited in bandwidth to 'B' and transmitted power of 'P'?

(symbols/notations carry their usual meaning)

A) C = log2(P+B)
B) C = B log2(1+P/N_0B)

C) $C = B \log2(P/N_0B)+1$

D) $C = 2*B$

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52) Which waves are demodulated by Costas loop?

A) VSB

B) SSB

C) MSK

D) DSBSC

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53) The total power of an AM transmitter having a carrier power of 50 W and the percentage of modulation at 80% is

A) 50 W

B) 66 W

C) 68 W

D) 70 W

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54) An AM wave has $V_{max} = 12$ V, and $V_{min} = 4$ V. Calculate the modulation index assuming single tone modulation.

(symbols/notations carry their usual meaning)

A) 2

B) 1

C) 1/2

D) 1/4

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55) What is the size of SP register in 8085 microprocessor?

A) 16 bits

B) 8 bits

C) 64 bits

D) 48 bits

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56) What is the size of memory which can be accessed by direct accessing in 8085 microprocessor?

A) 64 kB

B) 4 kB

C) 128 kB

D) 128 MB

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57) What is the Power Supply specification for 8085AH microprocessor?

A) Single +5V supply with 10% voltage margins

B) Dual +5V supply with 10% voltage margins

C) Single +10V supply with 5% voltage margins

D) Dual +5V supply with 5% voltage margins

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58) Which of the following memory is a volatile memory?

A) ROM
B) PROM
C) EEPROM
D) RAM

59) In 8085, whenever a signal is received at TRAP terminal, its program execution is transferred to a subroutine on address

A) 0000 H
B) 002C H
C) 0024 H
D) 0004 H

60) Then number of T-states of the instruction STA in 8085 microprocessor is

A) 10
B) 12
C) 13
D) 16

61) The command line interpreter that enables the users to interact with operating system is called the

A) Window
B) Shell
C) Process
D) Kernel

62) The average time required to reach a storage location in the memory to read or retrieve the contents of memory is called as

A) Turnaround time
B) Latency time
C) Access time
D) Response time

63) In 8085 microprocessor, how many T-states does OPCODE FETCH machine cycle normally require (i.e., when HOLD and WAIT signals are NOT forced)?

A) 4 to 6
B) 3 to 8
C) 2 to 3
D) 8 to 12

64) Calculate the size of memory address space for a 16 bit data and 20 bit address bus.

A) 1 MB
B) 2 MB

C) 3 MB

D) 4 MB

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65) The clock frequency of an 8085 microprocessor based system is 3 MHz. What should be the minimum pulse width of the INTR signal so that it is recognized successfully?

A) 5.6 µs

B) 5.7 µs

C) 5.8 µs

D) 5.9 µs

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66) In the 8085A Microprocessor, arithmetic and logical operations are performed through which of the following?

A) Stack

B) ALU

C) I/O

D) Register

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67) In a 16-bit microprocessor, a single word is

A) 16 bit data

B) 32 bit data

C) 8 bit data

D) 64 bit data

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68) What are the components of system bus?

A) CPU Bus, Address Bus, Data Bus

B) Memory, Control Unit, ALU

C) Data Bus, Address Bus, Control Bus

D) Register, PC, IR

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69) The 8085 Microprocessor has

A) 8-bits Data bus and 16-bits Address bus

B) 8-bits Data bus and 8-bits Address bus

C) 16-bits Data bus and 16-bits Address bus

D) 32-bits Data bus and 8-bits Address bus

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70) Which of the following is a negative-resistance microwave device for oscillator applications?

A) IMPATT Diode

B) Gunn Diode

C) Snap diode

D) Schottky Diode

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71) Which of the following device is used for coupling microwave energy?

A) Resonator

B) Waveguide
C) Loop
D) Antenna

72) TWT is basically a(n)

A) Amplifier
B) An oscillator
C) Wideband amplifier
D) Tuned amplifier

73) A waveguide termination having VSWR of 1.1 is used to dissipate 100 watts of power. The reflected power will be

A) 0.2268 W
B) 0.5868 W
C) 0.3468 W
D) 0.4568 W

74) If the drift velocity of electrons is 2×10^7 cm/s, through the active region of length 10×10^{-4} cm, then the natural frequency of the diode will be

A) 30 GHz
B) 20 GHz
C) 40 GHz
D) 50 GHz

75) The nodal method of circuit analysis is based on

A) KVL and Ohm's law
B) KCL and Ohm's law
C) KVL and KCL
D) KCL, KVL and Ohm's law

76) A connected graph has '5' number of branches and '4' number of nodes. It's rank is

A) 1
B) 2
C) 3
D) 4

77) The term $\sqrt{\dfrac{L}{C}}$ has the dimension of

A) Time
B) Capacitance
C) Inductance
D) Resistance

78) An independent voltage source in series with an impedance ZS=R+jXS delivers a maximum average power to a load impedance ZL when

A) ZL = R
B) ZL = jXS
C) ZL = R-jXS
D) ZL = R+jXS

79) The number of loop equations required to completely analysing a network comprising of 8 independent branches and 6 nodes including the reference node shall be

A) 3
B) 2
C) 4
D) 5

80) The Z-matrix of a two port network is given by $\begin{bmatrix} 0.8 & 0.3 \\ 0.3 & 0.7 \end{bmatrix}$. What will be the value of (admittance parameter)?

A) 1.8
B) 1.7
C) 0.9
D) 0.85

81) RADAR is an acronym for:

A) Radio Detection and Repulsion
B) Radio Device and Ranging
C) Radio Detection and Ranging
D) Ranging Detection and Retrieve

82) The ratio of the width to the height of the picture frame is called as

A) Rastar
B) Aspect Ratio
C) Length Ratio
D) Efficiency

83) If it takes a transmitted signal 1m sec to go up to the target and come back after reflection, how far is the transmitter from the target?

A) 150 Km
B) 150 m
C) 15 Km
D) 1500 m

84) A pulse compression radar transmits an encoded pulse having a frequency chirp from 990 MHz to 1010 MHz centred around 1 GHz. The range resolution capability of this radar is

A) 7.5 m
B) 7.5 Km
C) 75 m
D) 750 m

85) A pulse radar has a pulse repetition frequency (PRF) of 3 KHz. If the radar is emitting at 10 GHz, what is the maximum unambiguous range for this radar?

A) 5 Km
B) 5 m
C) 50 Km
D) 15 m

86) The colour band on the extreme left in general purpose fixed resistors represents:

A) Tolerance
B) First significant digit
C) Wattage Rating
D) Voltage Rating

87) A resistor in which the resistance changes exponentially with change in temperature is called as

A) Potentiometer
B) Phototransistor
C) Varactor
D) Thermistor

88) Which of the following is NOT a non-linear resistor?

A) Varistor
B) Precision resistor
C) NTC thermistor
D) PTC thermistor

89) In a single crystal of an intrinsic semiconductor, the number of free carriers at the Fermi level at room temperature is:

A) Half the total number of electrons in the crystal
B) Zero
C) Half the number of atoms in the crystal
D) Half the number of free electrons in the crystal

90) The magnetic susceptibility of paramagnetic material is:

A) Less than zero
B) Less than one but positive
C) Greater than one

D) Equal to zero

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91) According to divergence theorem

$$\oint A.dS = ?$$

A) $\int_V \nabla.A \, dV$

B) $\int_V A \, dV$

C) $\int_V \nabla \times A \, dV$

D) $\int_V curl(A) \, dV$

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92) What is the value of susceptibility in case of vacuum?

A) 1
B) 0.5
C) ∞
D) 0

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93) The Poynting vector is the rate of energy flow having SI Unit

A) $\dfrac{W}{m}$

B) $\dfrac{W}{m^2}$

C) $W \, m$

D) $\dfrac{W^2}{m^2}$

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94) A 50Ω transmission line is terminated in an impedance of 20-j50. What will be the reflection coefficient?

A) 0.69
B) 1.69
C) 6.9
D) 16.9

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95) A charged particle of mass 2Kg and charge 3C starts at point (1,-2,0) with velocity $4a_x + 3a_z \, m/s$ in an electric field $12a_x + 10a_y \, V/m$. At time t=1ms what will be the acceleration of the particle ?

A) $18a_x + 15a_y \ m/s$

B) $18a_x + 15a_z \ m/s^2$

C) $18a_x + 15a_y \ m/s^2$

D) $4a_x + 3a_z \ m/s^2$

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96) Which of the following is a non-recursive system?

A) Y (n-1) + 2 Y (n-2)
B) Y (n-3)
C) Y (n) + 2 Y (n+2)
D) 5Y (n-3)

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97) A discrete LTI system is non-causal if its impulse response is

A) $a^n U(n - 2)$
B) $a^{n-2} U(n)$
C) $a^{n+2} U(n)$
D) $a^n U(n +2)$

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98) What is the Nyquist rate for the signal $x(t) = \sin c(900t)$?

A) $90 Hz$
B) $900 Hz$
C) $450 Hz$
D) $45 Hz$

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99) If X (k) = {4,-j2, 0, j2} is the 4-point DFT of x (n), what will be the DFT of $x\{(n - 2)_4\}$?

A) {4,-j2, 0, j}
B) {4, 0, 0, j2}
C) {-j2, 4, 0, j2}
D) {4, j2, 0, -j2}

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100) If the system transfer function of a discrete time system $\dfrac{5z}{z-1}$ then system is

A) Stable
B) Unstable
C) Stable at z=1
D) Unstable at z=1