

OBJECTIVE TYPE QUESTIONS

- Q.1** The breakdown mechanism in a lightly doped p-n junction under reverse biased condition is called
(A) avalanche breakdown.
(B) zener breakdown.
(C) breakdown by tunnelling.
(D) high voltage breakdown.

Ans: A

In a CE – connected transistor amplifier with voltage – gain A_v , the capacitance C_{bc} is amplified by a factor

- Q.2** (A) A_v (B) $1 + A_v$
(C) $\sqrt{1 + A_v}$ (D) A_v^2

Ans: B

For a large values of $|V_{DS}|$, a FET – behaves as

- Q.3** (A) Voltage controlled resistor.
(B) Current controlled current source.
(C) Voltage controlled current source.
(D) Current controlled resistor.

Ans: C

Removing bypass capacitor across the emitter-leg resistor in a CE amplifier causes

- Q.4** (A) increase in current gain. (B) decrease in current gain.
(C) increase in voltage gain. (D) decrease in voltage gain.

Ans: D

For an op-amp having differential gain A_v and common-mode gain A_c the CMRR is given by

- Q.5** (A) $A_v + A_c$ (B) $\frac{A_v}{A_c}$
(C) $\frac{A_v}{A_c} + 1$ (D) $\frac{A_c}{A_v}$

Ans: B

- Q.6** When a step-input is given to an op-amp integrator, the output will be
(A) a ramp.
(B) a sinusoidal wave.
(C) a rectangular wave.
(D) a triangular wave with dc bias.

Ans: A

- Q.7** Hysteresis is desirable in Schmitt-trigger, because
(A) energy is to be stored/discharged in parasitic capacitances.
(B) effects of temperature would be compensated.
(C) devices in the circuit should be allowed time for saturation and desaturation.
(D) it would prevent noise from causing false triggering.

Ans: C

- Q.8** In a full-wave rectifier without filter, the ripple factor is
(A) 0.482 (B) 1.21
(C) 1.79 (D) 2.05

Ans: A

- Q.9** A minterm of the Boolean-function, $f(x, y, z)$ is
(A) $x' + y + z$ (B) $x y z'$
(C) $x z$ (D) $(y + z) x$

Ans: B

- Q.10** The minimum number of flip-flops required to construct a mod-75 counter is
(A) 5 (B) 6
(C) 7 (D) 8

Ans: C

- Q.11** Space charge region around a p-n junction
(A) does not contain mobile carriers
(B) contains both free electrons and holes
(C) contains one type of mobile carriers depending on the level of doping of the p or n regions
(D) contains electrons only as free carriers

Ans: A

- Q.12** The important characteristic of emitter-follower is
(A) high input impedance and high output impedance
(B) high input impedance and low output impedance
(C) low input impedance and low output impedance
(D) low input impedance and high output impedance

Ans: B

- Q.13** In a JFET, at pinch-off voltage applied on the gate
(A) the drain current becomes almost zero
(B) the drain current begins to decrease
(C) the drain current is almost at saturation value.
(D) the drain-to-source voltage is close to zero volts.

Ans: C

- Q.14** When an amplifier is provided with current series feedback, its
(A) input impedance increases and output impedance decreases
(B) input and output impedances both decrease
(C) input impedance decreases and output impedance increases
(D) input and output impedances both increase

Ans: D

- Q.15** The frequency of oscillation of a tunnel-collector oscillator having $L= 30\mu\text{H}$ and $C = 300\text{pf}$ is nearby
(A) 267 kHz
(B) 1677 kHz
(C) 1.68 kHz
(D) 2.67 MHz

Ans: B
$$f_o = \frac{1}{2\pi\sqrt{LC}} = \frac{1}{\sqrt{30 \times 10^{-6} \cdot 300 \cdot 10^{-12}}} = 1677.42 \text{ KHz}$$

- Q.16** The open-loop gain of an op-amp available in the market may be around.
(A) 10^{-1}
(B) 10
(C) 10^2
(D) 10^4

Ans: C

- Q.17** The control terminal (pin5) of 555 timer IC is normally connected to ground through a capacitor ($\sim 0.01 \mu\text{F}$). This is to
(A) protect the IC from inadvertent application of high voltage
(B) prevent false triggering by noise coupled onto the pin
(C) convert the trigger input to sharp pulse by differentiation
(D) suppress any negative triggering pulse

Ans: B

- Q.18** The value of ripple factor of a half-wave rectifier without filter is approximately
(A) 1.2
(B) 0.2
(C) 2.2
(D) 2.0

Ans: A

- Q.19** The three variable Boolean expression $xy + xyz + \bar{x}y + x\bar{y}z$

(D) All of the four parameters mentioned above would be affected

Ans: D

- Q.26** Wien bridge oscillator can typically generate frequencies in the range of
 (A) 1KHz – 1MHz
 (B) 1 MHz – 10MHz
 (C) 10MHz – 100MHz
 (D) 100MHz – 150MHz

Ans: A

- Q.27** A differential amplifier, amplifies
 (A) and mathematically differentiates the average of the voltages on the two input lines
 (B) and differentiates the input waveform on one line when the other line is grounded
 (C) the difference of voltages between the two input lines
 (D) and differentiates the sum of the two input waveforms

Ans: C

- Q.28** The transformer utilization factor of a half-wave rectifier is approximately
 (A) 0.6 (B) 0.3
 (C) 0.9 (D) 1.1

Ans: B

$$0.286 \approx 0.3$$

- Q.29** The dual of the Boolean expression: $x + y + z$ is
 (A) $x \cdot y + z$ (B) $x + yz$
 (C) $\bar{x} \cdot \bar{y} \cdot \bar{z}$ (D) $x \cdot y \cdot z$

Ans: C

$$\overline{x + y + z} = \bar{x} \cdot \bar{y} \cdot \bar{z}$$

- Q.30** It is required to construct a counter to count upto 100(decimal). The minimum number of flip-flops required to construct the counter is
 (A) 8 (B) 7
 (C) 6 (D) 5

Ans: A

- Q.31** The power conversion efficiency of an output stage is defined as _____.
 (A) (Load power + supply power) / supply power
 (B) (Load power + supply power) / (load power-supply power)
 (C) Load power / supply power
 (D) Supply power / load power

Ans. (C)

Power gain is defined as the ratio of output signal power to that of input signal power.

- Q.32** A highly stable resonance characteristic is the property of a ____ oscillator.
 (A) Hartley (B) Colpitts
 (C) Crystal (D) Weinbridge

Ans. (C)

- Q.33** The gate that assumes the 1 state, if and only if the input does not take a 1 state is called _____.
 (A) AND gate (B) NOT gate
 (C) NOR gate (D) Both (B) & (C)

Ans. (D)

$Y = \overline{A+B}$ therefore output is high only when the values of both A and B are 0.

- Q.34** The width of depleted region of a PN junction is of the order of a few tenths of a _____.
 (A) millimeter (B) micrometer
 (C) meter (D) nanometer

Ans. (B)

- Q.35** For NOR circuit SR flip flop the not allowed condition is _____.
 (A) S=0, R=0. (B) S=0, R=1.
 (C) S=1, R=1. (D) S=1, R=0.

Ans. (C)

When S=R=1 the output is subject to unpredictable behaviour when S and R return to 0 simultaneously.

- Q.36** In negative feedback the return ratio is _____.
 (A) 0 (B) 1
 (C) greater than 0 (D) greater than 1

Ans. (C)

In a negative feed back circuit, always the return ratio will be in the range of 0 to 1.

- Q.37** A phase shift oscillator uses _____.
 (A) LC tuning (B) Piezoelectric crystal
 (C) Balanced bridge (D) Variable frequency operation

Ans. (C)

- Q.38** The voltage gain of basic CMOS is approximately _____.
 (A) $(g_m r_o)/2$ (B) $2g_m r_o$

- (C) $1 / (2g_m r_o)$ (D) $2r_o / g_m$

Ans. (A)

- Q.39 Transistor is a
 (A) Current controlled current device.
 (B) Current controlled voltage device.
 (C) Voltage controlled current device.
 (D) Voltage controlled voltage device.

Ans. (A)

The output current depends on the input current.

- Q.40 A bistable multivibrator is a
 (A) Free running oscillator. (B) Triggered oscillator.
 (C) Saw tooth wave generator. (D) Crystal oscillator.

Ans. (B)

The transistors would change their state of operation from ON to OFF and vice versa depending on the external trigger provided.

- Q.41 If the output voltage of a bridge rectifier is 100V, the PIV of diode will be
 (A) $100\sqrt{2}V$ (B) $200/\pi V$
 (C) $100\pi V$ (D) $100\pi/2 V$

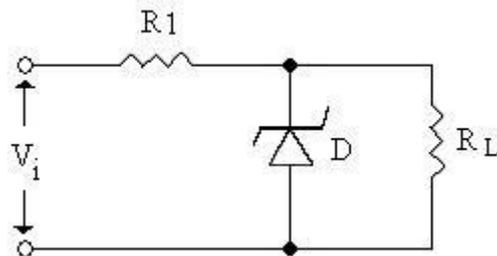
Ans. (D)

Peak inverse voltage = max secondary voltage

$$V_{dc} = 2V_m / \pi = 100$$

$$V_m = 100 \pi / 2$$

- Q.42 In the voltage regulator shown below, if the current through the load decreases,



- (A) The current through R1 will increase.
 (B) The current through R1 will decrease.
 (C) zener diode current will increase.
 (D) zener diode current will decrease.

Ans. (C)

- Q.43 In Boolean algebra $A + AB$
 (A) $A + B$

- (B) $A + B$
- (C) $A + B$
- (D) $A + B$

Ans. (A)

$$A.1+A B= A (1+B) +A B = A + AB +A B = A+B (A +A) = A+B$$

- Q.44** For a JFET, when V_{DS} is increased beyond the pinch off voltage, the drain current
- (A) Increases
 - (B) decreases
 - (C) remains constant.
 - (D) First decreases and then increases.

Ans. (C)

At pinch off voltage drain current reaches its maximum off. Now if we further increase V_{DS} above V_p the depletion layer expands at the top of the channel. The channel acts as a current limiter & holds drain current constant

- Q.45** The type of power amplifier which exhibits crossover distortion in its output is
- (A) Class A
 - (B) Class B
 - (C) Class AB
 - (D) Class C

Ans. (B)

The transistors do not conduct until the input signal is more than cut-in voltage of the B-A junction. In class B, the devices being biased at cut-off, one device stops conducting before the other device starts conducting leaving to Cross-over distortion.

- Q.46** The main advantage of a crystal oscillator is that its output is
- (A) 50Hz to 60Hz
 - (B) variable frequency
 - (C) a constant frequency.
 - (D) d.c

Ans. (C)

The quality factor (Q) of a crystal as a resonating element is very high, of the order of thousands. Hence frequency of a crystal oscillator is highly stable.

- Q.47** The lowest output impedance is obtained in case of BJT amplifiers for
- (A) CB configuration.
 - (B) CE configuration.
 - (C) CC configuration.
 - (D) CE with R_E configuration.

Ans. (C)

The output impedance in case of CC configuration is on the order of a few ohms. (In case of CB $\approx 450k$ and in case of CE $\approx 45k$)

- Q.48** N-channel FETs are superior to P-channel FETs, because
- (A) They have higher input impedance

- (B) They have high switching time
- (C) They consume less power
- (D) Mobility of electrons is greater than that of holes

Ans. (D)

- Q.49** The upper cutoff frequency of an RC coupled amplifier mainly depends upon
- (A) Coupling capacitor
 - (B) Emitter bypass capacitor
 - (C) Output capacitance of signal source
 - (D) Inter-electrode capacitance and stray shunt capacitance

Ans. (D)

- Q.50** Just as a voltage amplifier amplifies signal-voltage, a power amplifier
- (A) Amplifies power
 - (B) Amplifies signal current
 - (C) Merely converts the signal ac power into the dc power
 - (D) Merely converts the dc power into useful ac power

Ans. (D)

Which resistive component is designed to be temperature sensitive?

- A. Thermistor
- B. Rheostat
- C. Potentiometer
- D. Photoconductive cell

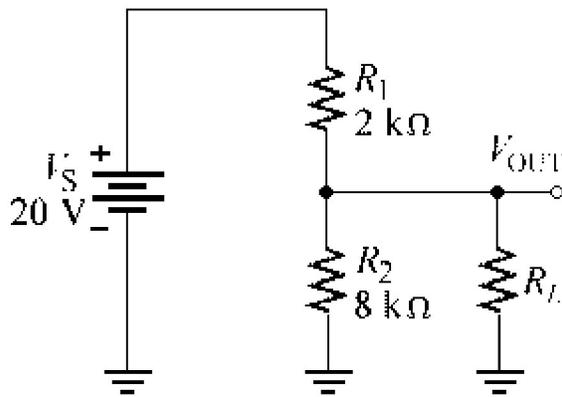
Answer: Option A

2. Batteries differ from fuel cells in that

- A. a battery is a closed system
- B. a battery uses hydrogen and oxygen to create electricity
- C. a battery uses a polymer electrolyte membrane
- D. none of the above

Answer: Option A

3.



If the load in the given circuit is $120\text{ k}\Omega$, what is the loaded output voltage?

- A. 4.21 V
- B. 15.79 V
- C. 16 V
- D. 19.67 V

Answer: Option B

4. The ___ of a capacitor affects the time it takes to charge and discharge.

- A. package style
- B. lead arrangement
- C. plate area
- D. voltage rating

Answer: Option C

5. The secondary current in a transformer depends on the secondary voltage and load resistance values.

- A. True
- B. False

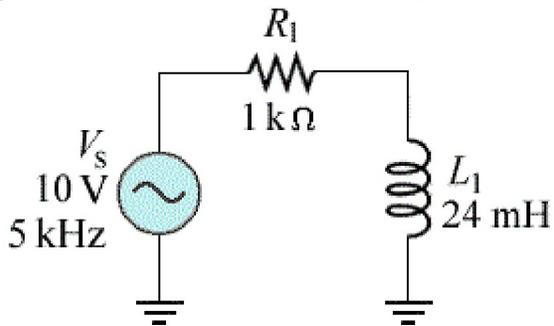
Answer: Option A

6. If a $7.5\text{ k}\Omega$ resistance is connected to a $10\text{ k}\Omega$ inductive reactance in a series RL circuit, then the impedance equals $12.5\text{ k}\Omega$.

- A. True
- B. False

Answer: Option A

7.

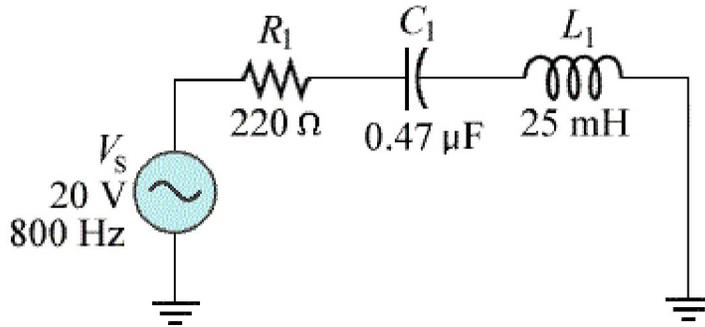


The voltage dropped across the resistor in the circuit in the given circuit is approximately equal to ___.

- A. 5 V
- B. 10 V
- C. 7.98 V
- D. 6.02 V

Answer: Option C

8.



What is the impedance of the circuit in the given circuit?

- A. 125.7Ω
- B. 297.6Ω
- C. 370.1Ω
- D. 423.3Ω

Answer: Option C

9. If a periodic pulse waveform is applied to an RC differentiating circuit, which two conditions are possible?

- A. $t_w \geq 5 \tau$ or $t_w > 5 \tau$
- B. $t_w = 5 \tau$ or $t_w > 5 \tau$
- C. $t_w \leq 5 \tau$ or $t_w < 5 \tau$
- D. $t_w \geq 5 \tau$ or $t_w < 5 \tau$

Answer: Option D

10. A pn junction allows current flow when

- A. the p-type material is more positive than the n-type material
- B. the n-type material is more positive than the p-type material
- C. both the n-type and p-type materials have the same potential
- D. there is no potential on the n-type or p-type materials

Answer: Option A

11. The voltage produced by a thermocouple is called the _____.

- A. hot junction voltage
- B. cold junction voltage
- C. Seebeck voltage
- D. Hooke voltage

Answer: Option C

12. The six basic forms of energy are:

- A. light, sun, magnetic, chemical, electrical, and mechanical
- B. electrical, mechanical, light, heat, magnetic, and chemical
- C. electrical, mechanical, sun, heat, chemical, and light
- D. potential, sun, light, chemical, electrical, and mechanical

Answer: Option B

13. If the frequency of a radio wave is increased, then its wavelength will:

- A. increase
- B. decrease
- C. remain the same
- D. cannot tell

Answer: Option B

14. A bipolar junction transistor has ____ regions of operation.

- A. 1
- B. 2
- C. 3
- D. 4

Answer: Option B

15. A NAND gate consists of an AND gate and an OR gate connected in series with each other.

- A. True
- B. False

Answer: Option B

16. Which of the following summarizes the important features of emitter-coupled logic (ECL)?

- A. negative voltage operation, high speed, and high power consumption
- B. good noise immunity, negative logic, high frequency capability, low power dissipation, and short propagation time
- C. slow propagation time, high frequency response, low power consumption, and high output voltage swings
- D. poor noise immunity, positive supply voltage operation, good low-frequency operation, and low power

Answer: Option A

17. A multiplexed display circuit uses a technique called time division modulation.

- A. True
- B. False

Answer: Option B

18. Memory configuration refers to the organization of storage bits within a memory.

- A. True
- B. False

Answer: Option A

19. The difference between analog voltage represented by two adjacent digital codes, or the analog step size, is the:

- A. quantization
- B. accuracy
- C. resolution
- D. monotonicity

Answer: Option C

20. A machine cycle is the time it takes a microprocessor to fetch and execute a complete instruction.

- A. True
- B. False

Answer: Option B

1. A silicon diode measures a low value of resistance with the meter leads in both positions. The trouble, if any, is

- A. the diode is open.
- B. the diode is shorted to ground.
- C. the diode is internally shorted.
- D. the diode is working correctly.

Answer: Option C

2. Single-element semiconductors are characterized by atoms with ____ valence electrons.

- A. 3
- B. 4
- C. 5
- D. 2
- E. none of the above

Answer: Option B

3. Under normal conditions a diode conducts current when it is

- A. reverse-biased.
- B. forward-biased.
- C. avalanched.
- D. saturated.

Answer: Option B

4. A diode conducts when it is forward-biased, and the anode is connected to the _____ through a limiting resistor.

- A. positive supply
- B. negative supply
- C. cathode
- D. anode

Answer: Option A

5. As the forward current through a silicon diode increases, the internal resistance

- A. increases.
- B. decreases.
- C. remains the same.

Answer: Option B

6. The movement of free electrons in a conductor is called
- A. voltage.
 - B. current.
 - C. recombination.
 - D. equilibrium.

Answer: Option B

-
7. For a forward-biased diode, the barrier potential _____ as temperature increases.
- A. decreases
 - B. remains constant
 - C. increases

Answer: Option A

-
8. The wide end arrow on a schematic indicates the _____ of a diode.
- A. ground
 - B. direction of electron flow
 - C. cathode
 - D. anode

Answer: Option D

-
9. An n-type semiconductor material
- A. is intrinsic.
 - B. has trivalent impurity atoms added.
 - C. has pentavalent impurity atoms added.
 - D. requires no doping.

Answer: Option C

Explanation:

N-type Semiconductor :

An intrinsic semiconductor material is a poor conductor. When a small amount of pentavalent impurity is added to the intrinsic material its conductivity rises sharply. This material formed after the addition of pentavalent impurity to the intrinsic semiconductor material is called N-type material. Addition of small amount of pentavalent atoms in the intrinsic material provides large number of free electrons for conduction.

10. For a forward-biased diode, as temperature is _____, the forward current _____ for a given value of forward voltage.

- A. decreased, increases
- B. increased, increases
- C. increased, decreases
- D. decreased, decreases

Answer: Option B

11. Which statement best describes an insulator?

- A. A material with many free electrons.
- B. A material doped to have some free electrons.
- C. A material with few free electrons.
- D. No description fits.

Answer: Option C

12. Effectively, how many valence electrons are there in each atom within a silicon crystal?

- A. 2
- B. 4
- C. 8
- D. 16

Answer: Option C

13. The boundary between p-type material and n-type material is called

- A. a diode.
- B. a reverse-biased diode.
- C. a pn junction.
- D. a forward-biased diode.

Answer: Option C

14. You have an unknown type of diode in a circuit. You measure the voltage across it and find it to be 0.3 V. The diode might be
- A. a silicon diode.
 - B. a germanium diode.
 - C. a forward-biased silicon diode.
 - D. a reverse-biased germanium diode.

Answer: Option B

15. An ideal diode presents a(n) _____ when reversed-biased and a(n) _____ when forward-biased.
- A. open, short
 - B. short, open
 - C. open, open
 - D. short, short

Answer: Option A

16. A reverse-biased diode has the _____ connected to the positive side of the source, and the _____ connected to the negative side of the source.
- A. cathode, anode
 - B. cathode, base
 - C. base, anode
 - D. anode, cathode

Answer: Option A

17. What types of impurity atoms are added to increase the number of conduction-band electrons in intrinsic silicon?
- A. bivalent
 - B. octavalent
 - C. pentavalent
 - D. trivalent

E. none of the above

Answer: Option C

18. What factor(s) do(es) the barrier potential of a pn junction depend on?

A. type of semiconductive material

B. the amount of doping

C. the temperature

D. all of the above

E. type of semiconductive material and the amount of doping but not the temperature

Answer: Option D

19. An atom is made up of

A. protons.

B. neutrons.

C. electrons.

D. all of the above

Answer: Option D

Explanation:

20. Reverse breakdown is a condition in which a diode

A. is subjected to a large reverse voltage.

B. is reverse-biased and there is a small leakage current.

C. has no current flowing at all.

D. is heated up by large amounts of current in the forward direction.

Answer: Option A

1. What are different categories of antenna ?

1. Wire Antennas - Short Dipole Antenna
2. Microstrip Antennas - Rectangular Microstrip (Patch) Antennas
3. Reflector Antennas - Corner Reflector
4. Travelling Wave Antennas - Helical Antennas
5. Aperture Antennas - Slot Antenna
6. Other Antennas - NFC Antennas

2. What is handover and what are its types?

Handover in mobile communication refers to the process of transferring a call from one network cell to another without breaking the call.

There are two types of handover which are as follows :

Hard Handoff : hard handoff is the process in which the cell connection is disconnected from the previous cell before it is made with the new one.

Soft Handoff : It is the process in which a new connection is established first before disconnecting the old one. It is thus more efficient and smart.

3. What is ionospheric bending?

When a radio wave travels into the ionospheric layer it experiences refraction due to difference in density. The density of ionospheric layer is rarer than the layer below which causes the radio wave to be bent away from the normal. Also the radio wave experiences a force from the ions in the ionospheric layer. If incident at the correct angle the radio wave is completely reflected back to the inner atmosphere due to total internal reflection. This phenomenon is called ionospheric reflection and is used in mobile communication for radio wave propagation also known as ionospheric bending of radio waves.

4. What is CDMA?

CDMA stands for Code Division Multiple Access which uses digital format. In CDMA systems several transmissions via the radio interface take place simultaneously on the same frequency bandwidth. User data is combined at the transmitter's side with a code, then transmitted. On air, all transmissions get mixed. At the receiver's side the same code is used as in the transmitter's side. The code helps the receiver to filter the user information of the transmitter from incoming mixture of all transmissions on the same frequency band and same time.

5. Explain the concept of frequency re-use.

The whole of the geographical area is divided into hexagonal shape geometrical area called cell and each cell having its own transceiver. Each BTS (cell site) allocated different band of frequency or different channel. Each BTS antenna is designed in such a way that it covers cell area in which it is placed with frequency allotted without interfering other cell signals. The design process of selecting and allocating channel groups for all of the cellular base station within system is called frequency reuse.

6. Explain Bluetooth.

Bluetooth is designed to be a personal area network, where participating entities are mobile and require sporadic communication with others. It is omnidirectional i.e. it does not have line of sight limitation like infra red does. Ericsson started the work on Bluetooth and named it after the Danish king Harold Bluetooth. Bluetooth operates in the 2.4 GHz area of spectrum and provides a range of 10 metres. It offers transfer speeds of around 720 Kbps.

7. What are GPRS services?

GPRS services are defined to fall in one of the two categories :

- PTP (Point to point)
- PTM (Point to Multipoint)

Some of the GPRS services are not likely to be provided by network operators during early deployment of GPRS due in part to the phased development of standard. Market demand is another factor affecting the decision of operators regarding which services to offer first.

8. What are the advantages of CDMA?

Advantages of CDMA are as follows :

1. Frequency diversity : Transmission is spread out over a large bandwidth due to that less affected by noise. If bandwidth is increased S/N ratio increases, which means noise will be reduced.
2. Multiplication Resistance : Chipping codes used for CDMA not only exhibit low correlation but also low autocorrelation. Hence a version of the signal that is delayed by more than one chip interval does not interfere with dominant signal as in other multipath environments.
3. Privacy : Due to spread spectrum is obtained by the use of noise like signals, where each user has a unique code, so privacy is inherent.
4. Graceful Degradation. In CDMA, more users access the system simultaneously as compared to FDMA, TDMA.

9. What are the advantages of spread spectrum?

Spread spectrum has the following advantages :

1. No crosstalk interference.
2. Better voice quality/data integrity and less static noise.
3. Lowered susceptibility to multipath fading.
4. Inherent security.
5. Co-existence.
6. Longer operating distances.
7. Hard to detect.
8. Hard to intercept or demodulate.
9. Harder to jam than narrow bands.
10. Use of ranging and radar.

10. Explain the steps involved in demodulating a signal.

Once the signal is coded, modulated and then sent, the receiver must demodulate the signal. This is usually done in two steps :

1. Spectrum spreading (e.g., direct sequence or frequency hopping) modulation is removed.
2. The remaining information bearing signal is demodulated by multiplying with a local reference identical in structure and synchronised with received signal.

11. How can a Pseudo Random Noise Code be usable?

To be usable for direct sequence spreading, a PN code must meet the following conditions :

1. Sequence must be built from 2 levelled numbers.
2. The codes must have sharp autocorrelation peak to enable code synchronization.
3. Codes must have a low cross-correlation value, the lower it is, more are the number of users which can be allowed in the system.
4. The codes should be "balanced" i.e. the difference between ones and zeros in code may only be 1.

12. What are the drawbacks of walsh codes?

Walsh codes have the following drawbacks :

1. The codes do not have a single, narrow autocorrelation peak.
2. The spreading is not over the whole bandwidth; instead the energy is spread over a number of discrete frequency components.
3. Although the full sequence cross correlation is identically zero, this does not hold for a partial sequence cross correlation function. Thus advantage of using orthogonal codes is lost.
4. Orthogonality is also affected by channel properties like multi path.

13. Explain radio environment in building.

Building penetration : Building penetration depends on the material used for construction and architecture used. This varies building to building and is based on building construction.

Building Height Effect : The signal strength is always higher at top floor and generally floor gain height is about 2.7dB/floor which is not dependent on building construction.

Building Floor Reception : The signal isolation between floors in a multi floor building is on the average about 20dB. Within a floor of 150 * 150 feet, the propagation loss due to interior walls, depending on the wall materials is about 20 dB between the strong and the weak areas.

14. List some advantages of GSM.

Here are some advantages of GSM :

1. GSM is mature, this maturity means a more stable network with robust features.
2. Less signal deterioration inside buildings.
3. Ability to use repeaters.
4. Talk time is generally higher in GSM phones due to pulse nature of transmission.
5. The availability of Subscriber Identity Modules allows users to switch networks and handset at will.
6. GSM covers virtually all parts of world so international roaming is not a problem.

15. What are the various types of numbers for network identity?

Various types of number for network identity are as follows :

1. MSISDN (Mobile station ISDN) Number : It is international mobile subscriber number which is normally called mobile number. It is unique worldwide.
2. MSRN (Mobile Subscriber Routing Number) : MSRN is used during mobile terminate trunk call to provide location of mobile subscriber.
3. HON (Hand Over Number) : HON is used for providing information required to transfer call from one B?SC to another BSC or to another MSC.
4. ISMI (International Mobile Subscriber Identity Number) : Purpose of ISMI is for location update and authentication.
5. TMSI (Temporary Mobile Subscriber Identity) : TMSI is used instead of IMSI to improve security efficiency of network.
6. IMEI : International Mobile Equipment Identity.

16. What are the functions of Base Station System (BSS)?

Functions of BSS are as follows :

1. Radio path control.
2. BTS and TC control.
3. Connection establishment with MS-NSS.
4. Mobility management, speech transcoding.
5. Connection of statistical data.

17. What are the parts of Network Management System (NMS)?

Following are the parts of network management system :

1. OMC : Operation and maintenance center - Computerized monitoring center.
2. NMC : Network Management Center - Centralized control of a network is done here.
3. OSS : Operation and support system - Used for supporting activities performed in an OMC and/or NMC.

18. What are applications of DSP?

Some selected applications or digital signal processing that are often encountered in daily life are listed as follows:

1. Telecommunication: Echo cancellation in telephone networks.
2. Military Radar signal processing
3. Consumer electronics Digital Audio/TV
4. Instrumentation and control
5. Image processing image representation, image compression
6. Speech processing speech analysis methods are used in automatic speech recognition
7. Medicine Medical diagnostic instrumentation such as computerised tomography (CT)
8. Seismology DSP techniques are employed in geophysical exploration for oil and gas.
9. Signal Filtering Removal of unwanted background noise.

19. What is analog-to-digital conversion of signals?

A discrete-time signal is defined by specifying its value only at discrete times, called sampling instants. When the sampled values are quantised and encoded, a digital signal is obtained. A digital signal is obtained from the analog signal by using an analog-to-digital converter. This entire process is referred to as the conversion of signals from analog to digital form.

20. What are the properties of ROC for z-Transform?

Properties of the ROC for the z-Transform :

1. $X(z)$ converges uniformly if and only if the ROC of the z-transform $X(z)$ of the sequence includes the unit circle. The ROC of $X(z)$ consists of a ring in the z-plane centered about the origin. That is, the ROC of the z-transform of $x(n)$ has values of z for which $x(n)r^{-n}$ is absolutely summable.
2. The ROC does not contain any poles.
3. When $x(n)$ is of finite duration then the ROC is the entire z-plane, except possibly $z=0$ and/or $z=\infty$.
4. If $x(n)$ is a right sided sequence, the ROC will not include infinity.
5. If $x(n)$ is a left sided sequence, the ROC will not include $z=0$. However if $x(n)=0$ for all $n>0$, the ROC will include $z=0$.

6. If $x(n)$ is two sided and if the circle $|z| = r_0$ is in the ROC, then the ROC will consist of a ring in the z -plane that includes the circle $|z|=r_0$.
7. If $X(z)$ is rational, then the ROC extends to infinity, i.e. the ROC is bounded by poles.
8. If $x(n)$ is causal, then the ROC includes $z=\infty$.
9. If $x(n)$ is anti-causal, then the ROC includes $z=0$.

21. What is DMA controller?
22. What is DMA channels?
23. What happens during DMA transfer?
24. What is half duplex transmission?
25. What is the difference between the bandwidth of half duplex and simplex transmission?
26. What are the processes required to perform interfacing successfully?
27. What is single input output interface? How it is different from single ended interface?
28. How does data transfer takes place between memory and input output ports?
29. What is parallel data transfer process?
30. Differentiate between PPI and input output devices.
31. What is parallel to serial conversion?
32. Explain the working of stepping motors.
33. What are the data pins of microprocessors? What is their use?
34. What is working principle of Profibus and how it transfer data?
35. Explain zener breakdown and avalanche breakdown?
36. What is the need of filtering ideal response of filters and actual response of filters? What is sampling theorem? What is impulse response?
37. What are advantages of dc supply over ac supply?
38. What is the voltage level of noise signal?
39. What happens when a magnetic material is heated strongly?
40. What is the effect of polarization of dielectric under heat?
41. Which number system is used in analysing and programming of microprocessors?
42. What happens when an inverter is placed between both inputs of S-K flip flop?
43. What is the chief characteristic of master-slave flip flop?
44. What logic function is obtained by adding an inverter to the output of an AND gate?
45. Which register which contains the instruction that is to be executed?
46. Which is used as storage location in the ALU and the control section of a computer?
47. What is simulator programme?
48. In C programming language, how many parameters can be passed to a function ?
49. Which filter has the highest Q factor?
50. What is multiplexing? Explain its primary advantage.
51. What is SSB modulation?
52. How can we remove unwanted sideband from SSB modulation?
53. How many channels are there in 2MB pulse code modulation?
54. What is cut off frequency?
55. Differentiate between pass band and stop band.
56. Explain Shannon-Hartley law.
57. Why interlacing is used in television?
58. Which type of modulation is used in TV transmission?
59. What is attenuation?
60. Differentiate between transducer and transponder.
61. What is op-amp?
62. Differentiate between conductor and inductor.

- 63.** What is meant by pre-emphasis and de-emphasis?
- 64.** Which semiconductor device is used as a voltage regulator and why?
- 65.** What are monitoring methods for Electronics activities?
- 66.** What is an interrupt?

Set - 1

1. Two main measures for the efficiency of an algorithm are

- a. Processor and memory
 - b. Complexity and capacity
 - c. Time and space
 - d. Data and space
-

2. The time factor when determining the efficiency of algorithm is measured by

- a. Counting microseconds
 - b. Counting the number of key operations
 - c. Counting the number of statements
 - d. Counting the kilobytes of algorithm
-

3. The space factor when determining the efficiency of algorithm is measured by

- a. Counting the maximum memory needed by the algorithm
 - b. Counting the minimum memory needed by the algorithm
 - c. Counting the average memory needed by the algorithm
 - d. Counting the maximum disk space needed by the algorithm
-

4. Which of the following case does not exist in complexity theory

- a. Best case
 - b. Worst case
 - c. Average case
 - d. Null case
-

5. The Worst case occur in linear search algorithm when

- a. Item is somewhere in the middle of the array
 - b. Item is not in the array at all
 - c. Item is the last element in the array
 - d. Item is the last element in the array or is not there at all
-

6. The Average case occur in linear search algorithm
- a. When Item is somewhere in the middle of the array
 - b. When Item is not in the array at all
 - c. When Item is the last element in the array
 - d. When Item is the last element in the array or is not there at all
-

7. The complexity of the average case of an algorithm is
- a. Much more complicated to analyze than that of worst case
 - b. Much more simpler to analyze than that of worst case
 - c. Sometimes more complicated and some other times simpler than that of worst case
 - d. None or above
-

8. The complexity of linear search algorithm is
- a. $O(n)$
 - b. $O(\log n)$
 - c. $O(n^2)$
 - d. $O(n \log n)$
-

9. The complexity of Binary search algorithm is
- a. $O(n)$
 - b. $O(\log)$
 - c. $O(n^2)$
 - d. $O(n \log n)$
-

10. The complexity of Bubble sort algorithm is
- a. $O(n)$
 - b. $O(\log n)$
 - c. $O(n^2)$
 - d. $O(n \log n)$
-

11. The complexity of merge sort algorithm is

- a. $O(n)$
 - b. $O(\log n)$
 - c. $O(n^2)$
 - d. $O(n \log n)$
-

12. The indirect change of the values of a variable in one module by another module is called

- a. internal change
 - b. inter-module change
 - c. side effect
 - d. side-module update
-

13. Which of the following data structure is not linear data structure?

- a. Arrays
 - b. Linked lists
 - c. Both of above
 - d. None of above
-

14. Which of the following data structure is linear data structure?

- a. Trees
 - b. Graphs
 - c. Arrays
 - d. None of above
-

15. The operation of processing each element in the list is known as

- a. Sorting
 - b. Merging
 - c. Inserting
 - d. Traversal
-

16. Finding the location of the element with a given value is:

- a. Traversal
- b. Search
- c. Sort

d. None of above

17. Arrays are best data structures

- a. for relatively permanent collections of data
- b. for the size of the structure and the data in the structure are constantly changing
- c. for both of above situation
- d. for none of above situation

18. Linked lists are best suited

- a. for relatively permanent collections of data
- b. for the size of the structure and the data in the structure are constantly changing
- c. for both of above situation
- d. for none of above situation

19. Each array declaration need not give, implicitly or explicitly, the information about

- a. the name of array
- b. the data type of array
- c. the first data from the set to be stored
- d. the index set of the array

20. The elements of an array are stored successively in memory cells because

- a. by this way computer can keep track only the address of the first element and the addresses of other elements can be calculated
- b. the architecture of computer memory does not allow arrays to store other than serially
- c. both of above
- d. none of above

Answers [Set-1]

1. Two main measures for the efficiency of an algorithm are

- c. Time and space

2. The time factor when determining the efficiency of algorithm is measured by

- b. Counting the number of key operations
3. The space factor when determining the efficiency of algorithm is measured by
- a. Counting the maximum memory needed by the algorithm
4. Which of the following case does not exist in complexity theory
- d. Null case
5. The Worst case occur in linear search algorithm when
- d. Item is the last element in the array or is not there at all
6. The Average case occur in linear search algorithm
- a. When Item is somewhere in the middle of the array
7. The complexity of the average case of an algorithm is
- a. Much more complicated to analyze than that of worst case
8. The complexity of linear search algorithm is
- a. $O(n)$
9. The complexity of Binary search algorithm is
- b. $O(\log n)$
10. The complexity of Bubble sort algorithm is
- c. $O(n^2)$
11. The complexity of merge sort algorithm is
- d. $O(n \log n)$
12. The indirect change of the values of a variable in one module by another module is called
- c. side effect
13. Which of the following data structure is not linear data structure?
- d. None of above
14. Which of the following data structure is linear data structure?
- c. Arrays
15. The operation of processing each element in the list is known as

d. Traversal

16. Finding the location of the element with a given value is:

b. Search

17. Arrays are best data structures

a. for relatively permanent collections of data

18. Linked lists are best suited

b. for the size of the structure and the data in the structure are constantly changing

19. Each array declaration need not give, implicitly or explicitly, the information about

c. the first data from the set to be stored

20. The elements of an array are stored successively in memory cells because

a. by this way computer can keep track only the address of the first element and the addresses of other elements can be calculated

Set - 2

1. The memory address of the first element of an array is called

a. floor address

b. foundation address

c. first address

d. base address

2. The memory address of fifth element of an array can be calculated by the formula

a. $LOC(\text{Array}[5]) = \text{Base}(\text{Array}) + w(5 - \text{lower bound})$, where w is the number of words per memory cell for the array

b. $LOC(\text{Array}[5]) = \text{Base}(\text{Array}[5]) + (5 - \text{lower bound})$, where w is the number of words per memory cell for the array

c. $LOC(\text{Array}[5]) = \text{Base}(\text{Array}[4]) + (5 - \text{Upper bound})$, where w is the number of words per memory cell for the array

d. None of above

3. Which of the following data structures are indexed structures?

- a. linear arrays
 - b. linked lists
 - c. both of above
 - d. none of above
-

4. Which of the following is not the required condition for binary search algorithm?

- a. The list must be sorted
 - b. there should be the direct access to the middle element in any sublist
 - c. There must be mechanism to delete and/or insert elements in list
 - d. none of above
-

5. Which of the following is not a limitation of binary search algorithm?

- a. must use a sorted array
 - b. requirement of sorted array is expensive when a lot of insertion and deletions are needed
 - c. there must be a mechanism to access middle element directly
 - d. binary search algorithm is not efficient when the data elements are more than 1000.
-

6. Two dimensional arrays are also called

- a. tables arrays
 - b. matrix arrays
 - c. both of above
 - d. none of above
-

7. A variable P is called pointer if

- a. P contains the address of an element in DATA.
 - b. P points to the address of first element in DATA
 - c. P can store only memory addresses
 - d. P contain the DATA and the address of DATA
-

8. Which of the following data structure can't store the non-homogeneous data elements?

- a. Arrays
 - b. Records
 - c. Pointers
 - d. None
-

9. Which of the following data structure store the homogeneous data elements?

- a. Arrays
- b. Records

- c. Pointers
 - d. None
-

10. Each data item in a record may be a group item composed of sub-items; those items which are indecomposable are called

- a. elementary items
 - b. atoms
 - c. scalars
 - d. all of above
-

11. The difference between linear array and a record is

- a. An array is suitable for homogeneous data but the data items in a record may have different data type
 - b. In a record, there may not be a natural ordering in opposed to linear array.
 - c. A record form a hierarchical structure but a linear array does not
 - d. All of above
-

12. Which of the following statement is false?

- a. Arrays are dense lists and static data structure
 - b. data elements in linked list need not be stored in adjacent space in memory
 - c. pointers store the next data element of a list
 - d. linked lists are collection of the nodes that contain information part and next pointer
-

13. Binary search algorithm can not be applied to

- a. sorted linked list
 - b. sorted binary trees
 - c. sorted linear array
 - d. pointer array
-

14. When new data are to be inserted into a data structure, but there is no available space; this situation is usually called

- a. underflow
 - b. overflow
 - c. housefull
 - d. saturated
-

15. The situation when in a linked list $START=NULL$ is

- a. underflow
- b. overflow

- c. housefull
 - d. saturated
-

16. Which of the following is two way list?

- a. grounded header list
 - b. circular header list
 - c. linked list with header and trailer nodes
 - d. none of above
-

17. Which of the following name does not relate to stacks?

- a. FIFO lists
 - b. LIFO list
 - c. Piles
 - d. Push-down lists
-

18. The term "push" and "pop" is related to the

- a. array
 - b. lists
 - c. stacks
 - d. all of above
-

19. A data structure where elements can be added or removed at either end but not in the middle

- a. Linked lists
 - b. Stacks
 - c. Queues
 - d. Deque
-

20. When inorder traversing a tree resulted E A C K F H D B G; the preorder traversal would return

- a. FAEKDCBHG
- b. FAEKCDHGB
- c. EAFKHDCBG
- d. FEAKDCHBG

Answers [Set-2]

1. The memory address of the first element of an array is called

d. base address

2. The memory address of fifth element of an array can be calculated by the formula

a. $LOC(\text{Array}[5]) = \text{Base}(\text{Array}) + w(5 - \text{lower bound})$, where w is the number of words per memory cell for the array

3. Which of the following data structures are indexed structures?

a. linear arrays

4. Which of the following is not the required condition for binary search algorithm?

c. There must be mechanism to delete and/or insert elements in list

5. Which of the following is not a limitation of binary search algorithm?

d. binary search algorithm is not efficient when the data elements are more than 1000.

6. Two dimensional arrays are also called

c. both of above

7. A variable P is called pointer if

a. P contains the address of an element in DATA.

8. Which of the following data structure can't store the non-homogeneous data elements?

a. Arrays

9. Which of the following data structure store the non-homogeneous data elements?

b. Records

10. Each data item in a record may be a group item composed of sub-items; those items which are indecomposable are called

d. all of above

11. The difference between linear array and a record is

d. All of above

12. Which of the following statement is false?

c. pointers store the next data element of a list

13. Binary search algorithm can not be applied to

a. sorted linked list

14. When new data are to be inserted into a data structure, but there is no available space; this situation is usually called

b. overflow

15. The situation when in a linked list START=NULL is

a. underflow

16. Which of the following is two way list?

d. none of above

17. Which of the following name does not relate to stacks?

a. FIFO lists

18. The term "push" and "pop" is related to the

c. stacks

19. A data structure where elements can be added or removed at either end but not in the middle

d. Deque

20. When inorder traversing a tree resulted E A C K F H D B G; the preorder traversal would return

b. FAEKCDHGB

Set - 3

1. Which data structure allows deleting data elements from front and inserting at rear?

a. Stacks

b. Queues

c. Deques

d. Binary search tree

2. Identify the data structure which allows deletions at both ends of the list but insertion at only one end.

a. Input-restricted deque

b. Output-restricted deque

c. Priority queues

d. None of above

3. Which of the following data structure is non-linear type?

- a. Strings
 - b. Lists
 - c. Stacks
 - d. None of above
-

4. Which of the following data structure is linear type?

- a. Strings
 - b. Lists
 - c. Queues
 - d. All of above
-

5. To represent hierarchical relationship between elements, which data structure is not suitable?

- a. Deque
 - b. Priority
 - c. Tree
 - d. All of above
-

6. A binary tree whose every node has either zero or two children is called

- a. Complete binary tree
 - b. Binary search tree
 - c. Extended binary tree
 - d. None of above
-

7. The depth of a complete binary tree is given by

- a. $D_n = n \log_2 n$
 - b. $D_n = n \log_2 n + 1$
 - c. $D_n = \log_2 n$
 - d. $D_n = \log_2 n + 1$
-

8. When representing any algebraic expression E which uses only binary operations in a 2-tree,

- a. the variable in E will appear as external nodes and operations in internal nodes
 - b. the operations in E will appear as external nodes and variables in internal nodes
 - c. the variables and operations in E will appear only in internal nodes
 - d. the variables and operations in E will appear only in external nodes
-

9. A binary tree can easily be converted into q 2-tree

- a. by replacing each empty sub tree by a new internal node
- b. by inserting an internal nodes for non-empty node
- c. by inserting an external nodes for non-empty node

d. by replacing each empty sub tree by a new external node

10. When converting binary tree into extended binary tree, all the original nodes in binary tree are

- a. internal nodes on extended tree
 - b. external nodes on extended tree
 - c. vanished on extended tree
 - d. None of above
-

11. The post order traversal of a binary tree is DEBFCA. Find out the pre order traversal

- a. ABFCDE
 - b. ADBFEC
 - c. ABDECF
 - d. ABDCEF
-

12. Which of the following sorting algorithm is of divide-and-conquer type?

- a. Bubble sort
 - b. Insertion sort
 - c. Quick sort
 - d. All of above
-

13. An algorithm that calls itself directly or indirectly is known as

- a. Sub algorithm
 - b. Recursion
 - c. Polish notation
 - d. Traversal algorithm
-

14. In a binary tree, certain null entries are replaced by special pointers which point to nodes higher in the tree for efficiency. These special pointers are called

- a. Leaf
 - b. branch
 - c. path
 - d. thread
-

15. The in order traversal of tree will yield a sorted listing of elements of tree in

- a. Binary trees
 - b. Binary search trees
 - c. Heaps
 - d. None of above
-

16. In a Heap tree

- a. Values in a node is greater than every value in left sub tree and smaller than right sub tree
 - b. Values in a node is greater than every value in children of it
 - c. Both of above conditions applies
 - d. None of above conditions applies
-

17. In a graph if $e=[u, v]$, Then u and v are called

- a. endpoints of e
 - b. adjacent nodes
 - c. neighbors
 - d. all of above
-

18. A connected graph T without any cycles is called

- a. a tree graph
 - b. free tree
 - c. a tree
 - d. All of above
-

19. In a graph if $e=(u, v)$ means

- a. u is adjacent to v but v is not adjacent to u
 - b. e begins at u and ends at v
 - c. u is processor and v is successor
 - d. both b and c
-

20. If every node u in G is adjacent to every other node v in G , A graph is said to be

- a. isolated
 - b. complete
 - c. finite
 - d. strongly connected
-

Answers [Set-3]:

1. Which data structure allows deleting data elements from front and inserting at rear?

- b. Queues
-

2. Identify the data structure which allows deletions at both ends of the list but insertion at only one end.

- a. Input-restricted deque
-

3. Which of the following data structure is non-linear type?

d. None of above

4. Which of the following data structure is linear type?

d. All of above

5. To represent hierarchical relationship between elements, which data structure is suitable?

c. Tree

6. A binary tree whose every node has either zero or two children is called

c. Extended binary tree

7. The depth of a complete binary tree is given by

d. $D_n = \log_2 n + 1$

8. When representing any algebraic expression E which uses only binary operations in a 2-tree,

a. the variable in E will appear as external nodes and operations in internal nodes

9. A binary tree can easily be converted into q 2-tree

d. by replacing each empty sub tree by a new external node

10. When converting binary tree into extended binary tree, all the original nodes in binary tree are

a. internal nodes on extended tree

11. The post order traversal of a binary tree is DEBFCA. Find out the pre order traversal

c. ABDECF

12. Which of the following sorting algorithm is of divide-and-conquer type?

c. Quick sort

13. An algorithm that calls itself directly or indirectly is known as

b. Recursion

14. In a binary tree, certain null entries are replaced by special pointers which point to nodes higher in the tree for efficiency. These special pointers are called

d. thread

15. The in order traversal of tree will yield a sorted listing of elements of tree in

b. Binary search trees

16. In a Heap tree

b. Values in a node is greater than every value in children of it

17. In a graph if $e=[u, v]$, Then u and v are called

d. all of above

18. A connected graph T without any cycles is called

d. All of above

19. In a graph if $e=(u, v)$ means

d. both b and c

20. If every node u in G is adjacent to every other node v in G, A graph is said to be

b. complete

SET 4

The _____ determines whether connected resistors are in series, parallel, or series-parallel?

- A. current flow
- B. power source
- C. voltage flow
- D. wattage source

Answer: Option A

2. Which resistive component is designed to be temperature sensitive?

- A. Thermistor
 - B. Rheostat
 - C. Potentiometer
-

D. Photoconductive cell

Answer: Option A

3. RTDs, strain gauges, and pressure transducers are _____ devices.

A. resistive

B. inductive

C. capacitive

D. solid-state

Answer: Option A

4. A decrease in base current of a CE amplifier causes the voltage measured between the emitter and the collector to increase.

A. True

B. False

Answer: Option A

5. The control of digital circuits is usually achieved with _____.

A. random pulses

B. clock signals

C. sophisticated gating

D. selected frequencies

Answer: Option B

6. Which digital system translates coded characters into a more intelligible form?

A. encoder

B. display

C. counter

D. decoder

Answer: Option D

7. Pressure transducers are devices that exhibit a change in resistance inversely proportional to a change in pressure.

- A. True B. False

Answer: Option B

8. An input to the mode pin of an arithmetic-logic unit (ALU) determines if the function will be _____.

- A. one's complemented
- B. positive or negative
- C. with or without carry
- D. arithmetic or logic

Answer: Option D

9. Memory configuration refers to the organization of storage bits within a memory.

- A. True B. False

Answer: Option A

10. The commutative law of addition and multiplication indicates that:

- A. the way we OR or AND two variables is unimportant because the result is the same
- B. we can group variables in an AND or in an OR any way we want
- C. an expression can be expanded by multiplying term by term just the same as in ordinary algebra
- D. the factoring of Boolean expressions requires the multiplication of product terms that contain like variables
-

Answer: Option A

11. Voltage is _____.

- A. the opposition to the flow of current
- B. the movement of free electrons
- C. the force that exists between charged particles
- D. the force that causes water to flow

Answer: Option C

12. A ___ resistor has color bands of yellow, violet, yellow, gold.

- A. 470 Ω 5%
- B. 5.7 M Ω 5%
- C. 37 k Ω 5%
- D. 470 k Ω 5%

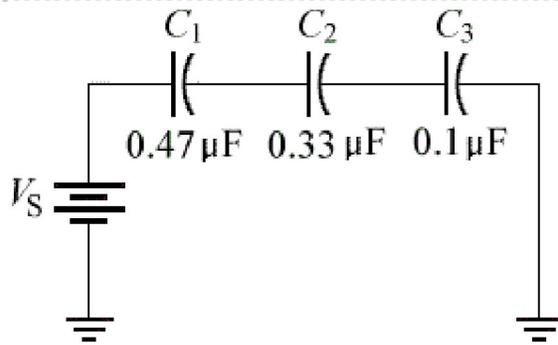
Answer: Option D

13. The output phase for a transformer is:

- A. in phase with the input
 - B. out of phase with the input
 - C. dependent on the direction of the primary and secondary windings
 - D. dependent on the frequency of the primary source
-

Answer: Option C

14.



What is the capacitance of the circuit shown in the given circuit?

- A. $0.066 \mu\text{F}$
- B. $0.9 \mu\text{F}$
- C. 65.97 pF
- D. 900 pF

Answer: Option A

15. As a capacitor is being charged, current flowing into the capacitor will:

- A. increase
- B. decrease
- C. remain the same
- D. cannot tell

Answer: Option B

16. After which time constant can a capacitor be considered to be fully charged?

A. first

B. third

C. fifth

D. seventh

Answer: Option C

17. If an input signal ranges from 20–40 μA (microamps), with an output signal ranging from .5–1.5 mA (milliamps), what is the ac beta?

A. 0.05

B. 20

C. 50

D. 500

Answer: Option C

18. If a 100 Ω resistance is connected to a 100 Ω capacitive reactance in a series RC circuit, the impedance equals 200 Ω .

A. True

B. False

Answer: Option B

19. The problem of interfacing IC logic families that have different supply voltages (V_{CC} s) can be solved by using a:

A. level-shifter

B. tri-state shifter

C. translator

D. level-shifter or translator

Answer: Option D

20. Power is measured in units of:

- A. joules x charge
- B. joules/work
- C. joules x voltage
- D. joules/time

Answer: Option D

Other Questions:

Q .1 Why are ICs more reliable than discrete circuits?

A . They are more reliable because of the elimination of the soldered joints and need for fewer interconnections.

Q .2 What is monolithic IC?

A . A monolithic IC is one in which all the circuits components and their interconnections are formed on a single thin wafer, called the substrate.

Q .3 Why is SiO₂ layer formed over the entire surface in a monolithic IC?

A . To prevent contamination of the epitaxial layer.

Q . 4 which configurations among CE,CCC,CB gives highest input impedance and low voltage gain?

A . CC has the highest input gain and lowest voltage gain i.e. less than unity.

Q .5 Why CE configurations is most popular in amplifier circuits?

A .because its current,voltage and power gains are quite high and the ratio of output impedance and the input impedance are quite moderate.

Q .6 What are 'emitter injection efficiency' and 'base transport factor' and how do they influence the transistor operation?

A . The ratio of current of injected carriers at emitter junction to the total emitter current is called the emitter efficiency.

The ratio of collector current to the base current is known as transport factor.

Q .7 Why collector is made larger than emitter and base?

A .collector is made physically larger than emitter and base because collector is to dissipate much power.

Q 8. Why is the width of the base region of a transistor is kept very small compared to other regions?

A . base region is kept small and very lightly doped so as to pass most of the injected charge carriers to the collector.

Q 9. Define beta in a transistor ?

A. the beta factor is the current gain factor of a common emitter circuit and is defined as the ratio of the collector current to the base current.

Q10. Why is diffusion technique of formation of resistors most widely used?

A. the diffused resistors can be processed while diffusing transistors , so the diffusion technique is the cheapest and , therefore , is most widely used.

Q11. Why are field-effect transistors called unipolar transistors?

A. in field effect transistors current conduction is by only one type of majority carriers and therefore, these are called unipolar transistors.

Q12. Why the channel of a JFET is never completely closed at the drain end?

A. If the channel is completely closed in JFET, then there will be no drain current, so there will be no voltage drop along the channel length and amount of the reverse will become uniform and wedge shaped depletion layer will become rectangular one.

Q 13. How is drain current controlled in a JEFET?

A . In a JFET drain current is controlled by controlling the reverse bias given t its gate.

Q 14. What is meant by drain characteristics of FETs ?

A . the curve drawn between drain current and drain-source voltage with gate-source voltage as the parameter is called the drain characteristics.

Q 15. What is meant by the transfer characteristics of FETs?

A . the curve drawn between drain current and gate-source voltage for a given value for a given value of drain-source voltage is called the transfer characteristics.

Q 16. Why the channel is open when $V_{gs}=0$ and $V_{ds} =0$?

A . when drain-source voltage is zero,there is no attracting potential at the drain,so no current flows inspite of the fact that the channel is fully open.

Q 17. What is pinch-off voltage in a JFET?

A. The value of drain-source voltage at which channel is pinched –off is called the pinch-off voltage.

Q 18. What are the factors that control the pinch-off voltage of JFET?

A . Electron charge,donor/acceptor concentration density .permittivity of channel material and half width of channel bar.

Q 19. Why FET is called a voltage controlled device?

A . in a FET , drain current is controlled by the effect of the extension of the field associated with the depletion region developed by the reverse bias on the gate ,so it is called a voltage controlled device.

Q 20. How does FET behave (i) small values of $|V_{ds}|$ (ii) larger value of $|V_{ds}|$?

A . (i) FET behave as an ordinary resistor for small values of $|V_{ds}|$ i.e. ohmic region

(ii)FET behave as a constant current source for larger values of $|V_{ds}|$ till breakdown.

Q 21. How does the current vary with the gate voltage in the saturation region?

A . drain current decreases with the increase in $|V_{ds}|$. When $V_{gs} = 0$; drain current $I_d = I_{dss}$, drain-source saturation current and when $V_{gs} = V_p$; drain current $I_d = 0$.

Q.22.What is meant by gate-source cut-off voltage?

A. The gate source bias voltage required to reduce the drain current to zero is designated the gate-source cut-off voltage $V_{gs(off)}$. It is equal to pinch-off voltage V_f .

Q.23 What is meant by saturation region?

A. The region of drain characteristic of a FET in which drain current remains fairly constant is called the saturation or pinch-off region.

Q.24 What is meant by drain-source saturation current I_{dss} ?

A. The drain current in pinch-off or saturation region with zero gate-source voltage ($V_{gs} = 0$) is referred to the drain-source saturation current I_{dss} .

Q.25. Why is input impedance of the FET very high?

A. FET has very high input impedance because its input circuit (gate-to-source) is reverse biased and the input gate current is very small (of the order of few nano-amperes).

Q.26. What is the value of gate-source voltage V_{gs} that gives drain current of both N-and P-channel JFETs a zero temperature coefficient?

A. $|V_{gs}| \sim |V_p| - 0.63 V$

Q.27. What is dynamic resistance of a JFET?

A. The ratio of change in drain-source voltage to change in drain current at a given gate-source voltage is known as ac drain resistance or dynamic resistance r_d

$$\text{i.e. } r_d = \Delta V_{ds} / \Delta I_d \quad \text{at constant } V_{gs}$$

Q.28. What is meant by transconductance with reference to JFET?

A. The control that gate-source voltage has over the drain current is measured by the transconductance of a JFET. It may be defined as the ratio of change in drain current to the change in gate-source voltage for a given value of drain-source voltage i.e.

$$G_m = \Delta I_d / \Delta V_{gs} \quad \text{at constant } V_{ds}$$

Q.29. Why is MOSFET called sometimes IGFET?

A. MOSFET is constructed with the gate terminal insulated from the channel so it is sometimes called insulated gate (or IGFET).

Q.30. What is the significant difference between the construction of an enhancement type MOSFET and a depletion type MOSFET?

A. In the depletion type MOSFET a channel is physically constructed and a current between drain and source is due to voltage applied across the drain-source terminals while in enhancement type construction no channel is formed during its construction. Voltage is applied to the gate in case of enhancement type MOSFET, to develop a channel of charge carriers so that a current results when a voltage is applied across the drain-source terminals.

Q.31. Why E-MOSFET is called sometimes normally-off MOSFET?

A. E-MOSFET operates with large positive gate voltages only and does not conduct when gate-source voltage $V_{gs}=0$, so it is called normally-off MOSFET.

Q.32. What is meant by gate-to-source threshold voltage in E-MOSFET?

A. The minimum value of gate-to-source voltage V_{gs} that is required to form the inversion layer is termed the gate-to-source threshold voltage V_{gst} .

Q.33. How is threshold voltage of the MOS transistor adjusted?

A. Threshold voltage of a MOS transistor can be adjusted by the following three methods.

1. If the silicon crystal orientation is $\langle 111 \rangle$, it results in high threshold voltage. If the crystal has orientation of $\langle 100 \rangle$, the value of threshold will go to half as compared to the previous one.

2. Instead of SiO_2 , a layer of Si_3N_4 and SiO_2 is used. It makes the dielectric constant twice as that of SiO_2 alone. This causes V_{gst} to come down to half.

3. Instead of aluminium as gate electrode polycrystalline silicon doped with boron is used as the gate electrode. This causes reduction in contact potential between gate electrode and gate dielectric resulting in reduction of V_{GST} .

Q.34. Why MOSFET are never connected or disconnected in the circuit when power is ON?

A. If a MOSFET is connected or disconnected in the circuit when power is ON, transient voltages caused by inductive kickback and other effects may exceed $V_{gs}(\text{max})$ and thus wipe out the MOSFET.

Q.35. Name the factors which make the JFET superior to BJT?

A. The high impedance, low output impedance and low noise level make JFET far superior to the BJT.

Q.36. In communication electronics, why JFET RF amplifier is used in a receiver instead of BJT amplifier?

A. The reasons for using JFET RF amplifier in receiver instead of BJT amplifier?

1. The noise level of JFET is very low.

2. The antenna of the receiver receives a very weak signal that has an extremely low amount of current. Since JFET is a voltage controlled device, it will respond to low current signal provided by the antenna.

Q.37. What is unijunction transistor?

A. Unijunction transistor (UJT) is a two-layer, three-terminal solid-state (silicon) switching device.

Q.38. Give the special features of a UJT.

A. The special features of a UJT are:

1. A stable triggering voltage (V_p) - a fixed fraction of applied interbase voltage V_{bb} .

2. A very low value of triggering current.

3. A high pulse current capability.

4. A negative resistance characteristic.

5. Low cost.

Q.39. Which are the members of "thyristor family"?

A. The members of thyristor family are SCR, triac, Shockley diode, SCS, SBS, SUS, CSCR, LASCR, LAS, LASCS, GCS, GTO, etc.

Q.40. How is current limited in conducting state of an SCR?

A. The current in conducting state of an SCR is controlled by external impedance.

Q.41. What is the effect of negative gate current on a normal SCR?

A. Negative gate current will increase the holding current of the SCR.

Q.42. What is false triggering?

A. False triggering is unintended turn-on of an SCR either through gate due to noise pick-up or excessive anode voltage.

Q.43. What are the factors on which 'turn-off time' of an SCR depends?

A. Turn-off time of an SCR depends upon doping densities, recombination time, junction temperature, on-state current, rate of decay of on-state current.

Q.44. How is the forced turn-off of an SCR different from natural turn-off?

A. In forced turn-off of an SCR current is brought below the holding current by an additional dedicated circuit employing energy storage elements while in natural turn-off, it is the natural voltage/current variation.

Q.45. Why 'pulse triggering' is preferred and when does it fail?

A. Pulse triggering is preferred as it is effective to turn-on an SCR keeping the device gate dissipation low and ensures a fast turn-on keeping the di/dt stress on the device low.

Pulse triggering shall fail if the pulse is of short duration and the load circuit contains large inductance. With highly inductive load, the device current builds up slowly. If the pulse duration is small and the anode current is not able to build up to latching current, I_L , the device turns off on removal of gate pulse.

Q.46. Why is it necessary to keep supply voltage much less than breakover voltage of an SCR?

A. The supply voltage is kept much less than breakover voltage of an SCR otherwise the device will get damaged.

Q.47. What is meant by breakover voltage of an SCR?

A. The minimum forward voltage, with gate open, at which SCR starts conducting heavily (i.e. turns on) is called the breakover voltage.

Q.48. What is maximum on-state voltage in reference to an SCR?

A. Maximum on-state voltage is the maximum value of the voltage appearing across the SCR during conduction.

Q.49. What is meant by forward current rating of an SCR?

A. The maximum value of anode current, that an SCR can handle safely (without any damage) is called the forward current rating of the SCR.

Q.50. What is holding current in an SCR?

A. Holding current is the maximum on-state current required to keep the SCR in conducting state without any gate drive.

Q.51. Define latch current of an SCR?

A. Latching current is the minimum device current, which must be attained by the device, before the gate drive is removed.

Q. 52. Give the typical values of current ratings of SCR?

A. Forward breakover current - less than a few hundred micro-amperes.

Peak forward current 30 A to over 100 A.

Holding current - a few mA to few hundred milli-amperes.

Q. 53. What is triac?

A. The triac is a three terminal, four layer bidirectional semiconductor device. It incorporates two SCRs connected in inverse parallel with a common gate terminal in a single chip. Triac is an abbreviation for a triode ac switch.

Q.54. What is diac?

A. A diac is a P-N-P-N structured four-layer, two-terminal semiconductor device. This is just like a triac but without gate terminal. Diac is an abbreviation for a diode ac switch.

Q.55. What is drift velocity?

A. The average velocity of a free electron is known as the drift velocity.

Q.56 What is the mobility of a free electron?

A. Drift velocity per unit electric field.

Q.57 What is meant by a fuse and on what principle does it operate?

A. Fuse is a device used in an electrical circuit for protecting electrical equipment against short circuits or overloads.

The action of fuse is based upon the heating effect of electric current.

Q.58 Is it possible to make a pure metal a superconductor?

A. Not all metals can be converted into the superconductors because superconductors occur between well defined limits of atomic volume.

Q.59 What is superconductivity?

A. The phenomenon that electrical resistivity of some metals e.g. mercury disappears completely at very low temperature is known as superconductivity

Q60. What is energy gap in semiconductors?

A. In the super conducting state an energy gap $E_g = 3.5KT$ separates superconducting electrons below from normal electrons above the gap.

Q61. Define critical magnetic field of a superconductors

A. Maximum field that can be applied to the superconductors without destroying the superconducting behaviour.

Q62. What is meant by electrostriction?

A. In most materials dielectric polarization develops a mechanical distortion, but a mechanical distortion does not produce polarization. This electromechanical effect, which is present in all material is called electrostriction.

Q.63 What is orientational polarisation?

A. The polarisation due to the alignment of electrical dipole moments is called the orientational polarization.

Q.64 What is electric susceptibility of a dielectric?

A. Electrical susceptibility of a dielectric medium is defined as the ratio of bound charge density to free charge density.

Q. 65 What is polarisation ?

A. The sum of dipole moments per unit volume in a material is called the polarization vector or the dielectric polarization, P.

Q .66 What is curie point?

A. At a temp higher than a critical value, called the curie point, ferromagnetic material lose their magnetic properties.

Q.67 what are ferrites ?

A. Ferrites is a special group of ferromagnetic materials, that occupy an intermediate position between ferromagnetic and non-ferromagnetic materials.

Q. 68 what is the value of the permeability if free space?

Q.69 What is magnetostriction?

A . When a ferromagnetic material is magnetised ,its dimensions change slightly and the sample being magnetised either expands or contracts in the direction of the magnetisation.this magnetically induced reversible electrical strain is called the magnetostriction.

Q.70. what is villari effect?

A . The converse of the magnetostriction is known as the villari effect.

Q 71. What are eddy currents?

A . if the magnetic circuit is made up of iron and if the flux in the circuit is variable,currents will be induced by induction in the iron circuit itself.all such currents are called eddy current.

Q 72. What is magnetic hysteresis?

A . the phenomenon of lagging of magnetization or induction flux density behind the magnetization is known as magnetic hysteresis.

Q 73. Define a hole in a semiconductor?

A . vacancy left in the valence band because of lifting of electron from valence band to conduction band is known as hole.

Q 74. What is a hole current?

A . the movement of the hole from positive to the negative terminal constitutes hole current.

Q 75. Why silicon and germanium are the most widely used semiconductor materials?

A . because the energy required to release an electron from their valence band is very small.

Q 76. What is the main factor for controlling the thermal concentration of the free electrons and the holes?

A . temperature.

Q77 . define mean life time of a carrier.

A . the amount of time between the creation and disappearance of free electron is called the life time.

Q78.in which bands do the movement of electrons and holes take place?

A . free electrons move in the conduction band and the holes move in the valence band.

Q 79 . what is Fermi level in a semiconductor?

A .fermi level in a semiconductor can be defined as the maximum energy that an electron in a semiconductor have at zero degree absolute.

Q 80. What is doping?

A . a small amount of impurity added to improve the conductivity of semiconductor.

Q 81. What are the impurities that make a semiconductor N-type?

A . the pentavalent donor such as arsenic ,antimony,bismuth etc.

Q 82.what are the impurities that make a semiconductor P-type?

A . trivalent impurities such as the boron ,gallium,indium.

Q 83 . what is a hall effect ?

A . when a specimen is placed in a transverse magnetic field and a direct current is passed through it,then an electric field is induced across its edges in the perpendicular direction of current as well as magnetic field .this phenomenon is known as hall effect.

Q 84. What is a step graded junction?

A . A junction is said to be step graded if there is an abrupt change from the acceptor ion concentration on the P-side to donor ion concentration on the N-side such as alloyed or fused junction.

Q 85. What is linear graded junction?

A . A junction is said to be linear graded if the charge concentration varies gradually with the distance in its transition region such as a growth junction.

Q 86. What is reverse saturation current of a diode?

A . The current due to the minority carriers in reverse biased is called reverse saturation current.

Q 87. What are the two mechanism of breakdown in p-n junction diode?

A. Avalanche and zener breakdown.

Q 88.name the breakdown in the lightly doped p-n junction under reverse biased condition?

A . Avalanche breakdown.

Q 89. Name the breakdown in the heavily doped p-n junction under reverse biased condition?

A . Zener breakdown.

Q 90. Is reverse saturation current of a junction diode independent of reverse bias voltage?

A . Yes.

Q 91. Germanium is more temperature dependent than silicon why?

A .Because the reverse saturation current in case of germanium is 1,000 times larger.

Q 92. Define dynamic resistance of a P-N junction diode in the forward biased condition.

A. The resistance offered by a P-N junction diode to the changing forward current is defined as the dynamic resistance .

Q 93. Is 'reverse recovery time' due to majority carriers or the minority carriers?

A . Reverse recovery time is due to the large number of the minority carriers present in both of the P and N regions.

Q 94. What is a zener diode?

A . Zener diode is a P-N junction diode specially designed for operation in its breakdown region.

Q 95. What is zener voltage?

A . The voltage at which zener diode breaks down is called the zener diode.

Q 96. What is tunnelling?

A . The mechanism of conduction in a semiconductor diode in which charge carriers punch through a barrier directly instead of climbing over it is called tunnelling.

Q 97. What is varactor diode?

A . A varactor diode is a special fabricated P-N junction impurity P-N junction with proper impurity concentration profile and operated under reverse-biased mode so as to give a variable junction capacitance.

Q 98. What are photo-detectors?

A .photo detectors are devices that provide a change in the electrical characteristics in the presence of a change in light output.e.g. LDR

Q 99. Why LCDs are not operated from ac supply of frequency lower than 25Hz and higher than 50Hz?

A . if the frequency of the supply to LCDs is lower than 25Hz,a visible flicker would be produced and if it exceeds 50Hz ,the current drawn will be more.

Q 100. Why an ordinary transistor is called bipolar?

A . Because the transistor operation is carried out by two types of charge carriers .

Q 101. Why transistor is called current controlled device?

A . the output voltage, current,or power is controlled by the input current in a transistor so it is called the current controlled device.

Q 102. Why emitter is always forward biased?

A . to supply majority charge carriers.

Q 103. What is early effect?

A. the modulation of the effective base width by the collector voltage is known as early effect.

Q 104. What is quiescent point?

A . it is a point on the DC load line which represents V_{ce} and I_c in the absence of AC signal and variations in V_{ce} and I_c take place around this point when AC signal is applied.