# Unit 18: Electronics

82 MCQs. Correct option in bold. 1 mark each.

**1.** Materials whose conductivity lies between conductors and insulators are
**A. semiconductors** B. insulators
C. alloys D. superconductors

**2.** Pure semiconductors are called
A. extrinsic semiconductors **B. intrinsic semiconductors**
C. n-type semiconductors D. p-type semiconductors

**3.** Semiconductors doped with specific impurities are called
A. superconductors B. insulators
**C. extrinsic semiconductors** D. intrinsic semiconductors

**4.** When a pentavalent impurity is added to silicon, the result is
A. p-type semiconductor B. an insulator
C. a conductor **D. n-type semiconductor**

**5.** When a trivalent impurity is added to silicon, the result is
A. an insulator **B. p-type semiconductor**
C. a conductor D. n-type semiconductor

**6.** A pentavalent impurity has _____ valence electrons.
A. three B. four C. six **D. five**

**7.** A vacant spot in a covalent bond is called a
A. electron B. neutron **C. hole** D. proton

**8.** The majority charge carriers in an n-type semiconductor are
**A. electrons** B. neutrons C. holes D. protons

**9.** The majority charge carriers in a p-type semiconductor are
A. protons **B. holes** C. electrons D. neutrons

**10.** Pentavalent impurities are called donors because they
A. donate protons B. accept electrons
C. donate holes **D. donate free electrons**

**11.** Trivalent impurities are called acceptors because they
**A. accept electrons creating holes** B. accept protons
C. donate holes D. donate electrons

**12.** The region near the junction that is free of mobile charges is the
A. conduction region B. valence region
**C. depletion region** D. doped region

**13.** The potential barrier for a germanium crystal is about
A. 7 V **B. 0.3 V** C. 3 V D. 0.7 V

**14.** The potential barrier for a silicon crystal is about
A. 0.3 V B. 7 V **C. 0.7 V** D. 3 V

**15.** A PN junction diode allows current to pass in
**A. one direction only** B. no direction
C. both directions equally D. only when heated

**16.** A PN junction diode is used as a
A. transformer B. resistor
C. amplifier **D. rectifier**

**17.** The biasing in which the diode allows current to flow is called
A. no bias **B. forward bias**
C. reverse bias D. zero bias

**18.** A diode is forward biased when the positive terminal of the DC source is connected to the
**A. p-type** B. n-type C. ground D. neutral

**19.** In forward bias, the depletion region
A. disappears permanently B. increases in width
**C. decreases in width** D. remains unchanged

**20.** In forward bias, the barrier potential
A. is increased B. becomes infinite
C. does not change **D. is reduced**

**21.** When the potential at the anode (p-type) is smaller than at the cathode (n-type), the diode is
**A. reverse biased** B. unbiased
C. conducting D. forward biased

**22.** In reverse bias, the depletion region
A. becomes narrower B. remains the same
C. disappears **D. becomes wider**

**23.** In reverse bias, only a small current flows due to
A. majority charge carriers B. neutrons
**C. minority charge carriers** D. protons

**24.** The small current in reverse bias is of the order of a few
A. milliamperes **B. microamperes**
C. amperes D. kiloamperes

**25.** The small current in a reverse-biased diode is called
A. base current B. forward current
C. emitter current **D. reverse or leakage current**

**26.** A light-emitting diode (LED) emits light when it is
A. reverse biased **B. forward biased**
C. heated D. not connected

**27.** In an LED, when electrons fall into holes, they
A. absorb energy B. stay at the same level
**C. radiate energy as light** D. lose charge

**28.** A transistor is a _____ terminal device.
**A. three** B. two C. four D. five

**29.** The three terminals of a transistor are
A. source and sink only B. drain, source and gate only
C. anode, cathode and gate **D. emitter, base and collector**

**30.** A transistor is a _____ device because both holes and electrons participate in conduction.
A. unipolar B. diode only
**C. bipolar** D. passive

**31.** The two types of transistors are
A. PN and NP only **B. PNP and NPN**
C. NPP and PPN D. PPP and NNN

**32.** An NPN transistor is made by joining
**A. one p-type between two n-types** B. one n-type between two p-types
C. three p-types D. three n-types

**33.** A PNP transistor is made by sandwiching
A. three n-types **B. an n-type between two p-types**
C. three p-types D. a p-type between two n-types

**34.** The heavily doped region of a transistor is the
A. base B. collector
C. all of these **D. emitter**

**35.** The base of a transistor is
**A. thin and lightly doped** B. thick and heavily doped
C. large and moderately doped D. absent

**36.** The function of a transistor is to
A. block light B. store charge
**C. amplify current** D. reduce current

**37.** In normal operation of an NPN transistor, the emitter-base junction is
A. unbiased B. open
C. reverse biased **D. forward biased**

**38.** In normal operation of an NPN transistor, the collector-base junction is
A. open B. forward biased
**C. reverse biased** D. unbiased

**39.** The relation between emitter, collector and base currents is
A. IB = IC + IE **B. IE = IC + IB**
C. IC = IE + IB D. IE = IC − IB

**40.** The current gain β of a transistor is given by
**A. IC/IB** B. IC/IE C. IE/IB D. IB/IC

**41.** The current gain α of a transistor is given by
A. IB/IC B. IE/IC **C. IC/IE** D. IC/IB

**42.** The majority charge carriers in the emitter of an NPN transistor are
A. holes **B. electrons**
C. pentavalent atoms D. trivalent atoms

**43.** In a junction transistor, IC = 99.9 mA and IB = 0.1 mA. The emitter current is
A. 99.9 mA B. 0.1 mA C. 99.8 mA **D. 100 mA**

**44.** If IE = 1 mA and IC = 0.25 mA, the base current IB is
**A. 0.75 mA** B. 1.25 mA C. 0.95 mA D. 0.25 mA

**45.** In a junction transistor, IE = 5.82 mA and IB = 120 μA. The collector current is
A. 120 mA B. 5.94 mA **C. 5.7 mA** D. 6.0 mA

**46.** For IB = 600 μA and IC = 30 mA, the current gain β is
A. 500 B. 5 C. 0.02 **D. 50**

**47.** For IC = 150 mA and β = 190, the base current required is about
A. 190 mA **B. 0.8 mA** C. 0.15 mA D. 28.5 mA

**48.** When the emitter current changes by 4 mA and the collector current by 3.5 mA, β is
**A. 7** B. 0.875 C. 14 D. 1.14

**49.** The transistor was developed in 1948 at
A. NASA B. MIT
**C. Bell Laboratories** D. CERN

**50.** The transistor invention was awarded the Nobel Prize in Physics in
A. 1948 B. 1966 C. 1936 **D. 1956**

**51.** A relay is an
A. type of diode **B. electrically operated switch**
C. electronic amplifier D. source of emf

**52.** Relays are used to control a high power circuit with a
**A. low power circuit** B. high power circuit
C. magnet only D. gas

**53.** A solid state relay (SSR) has
A. springs B. many moving parts
**C. no moving parts** D. mechanical contacts

**54.** A transistor can be used as a switch if it is biased in the
A. forward region only B. saturation region only
C. cut-off region only **D. saturation and cut-off regions**

**55.** When there is no base current, the transistor is in
**A. cutoff** B. breakdown
C. amplification D. saturation

**56.** When a large enough base current flows, the transistor is in
A. breakdown **B. saturation**
C. reverse bias D. cutoff

**57.** In the saturation state, the collector-emitter path behaves like a
A. open switch B. diode
C. capacitor **D. closed switch**

**58.** Digital electronic circuits deal with signals having
A. three states only B. no states
**C. only two states** D. infinite states

**59.** Boolean algebra is based on the three basic operators
**A. AND, OR and NOT** B. AND, NAND and NOR
C. NOT, NAND and XOR D. OR, NOR and XOR

**60.** Each digit in binary (0 or 1) is called a
A. gate **B. bit** C. byte D. qubit

**61.** An analogue-to-digital converter (ADC)
A. converts digital into analogue
B. amplifies voltage
**C. converts continuous analogue signals into discrete digital signals**
D. converts AC to DC

**62.** A digital-to-analogue converter (DAC)
A. amplifies current
B. converts analogue into digital
C. stores bits
**D. converts digital signals into analogue signals**

**63.** Analogue signals
**A. vary continuously** B. are always zero
C. have only one value D. have only two values

**64.** A table of inputs and outputs of a logic system in binary form is called a
A. logic table **B. truth table**
C. circuit table D. periodic table

**65.** The three fundamental logic gates are
A. OR, NOR and NAND B. NOT, NAND and NOR
C. AND, NAND and NOR **D. AND, OR and NOT**

**66.** The output of an AND gate is 1 only when
A. any input is 1 B. any input is 0
**C. all inputs are 1** D. all inputs are 0

**67.** The Boolean expression of an AND gate is
**A. X = A.B** B. X = NOT A
C. X = NOT(A.B) D. X = A + B

**68.** The output of an OR gate is 0 only when
A. all inputs are 1 **B. all inputs are 0**
C. any input is 0 D. any input is 1

**69.** The Boolean expression of an OR gate is
**A. X = A + B** B. X = NOT A
C. X = A.B D. X = NOT(A + B)

**70.** A NOT gate has
A. two inputs and one output B. two inputs and two outputs
C. no input **D. one input and one output**

**71.** If the input of a NOT gate is 1, its output is
A. 2 B. 1 **C. 0** D. undefined

**72.** NAND and NOR gates are called universal gates because
A. they are the fastest
**B. they can be used to make all the other gates**
C. they have the most inputs
D. they are the cheapest

**73.** The output of a NAND gate is 0 when
A. any input is 0 B. both inputs are 0
**C. both inputs are 1** D. A is 0 and B is 1

**74.** The Boolean expression for a NAND gate is
**A. X = NOT(A.B)** B. X = NOT(A + B)
C. X = A + B D. X = A.B

**75.** The output of a NOR gate is 1 only when
A. any input is 0 B. any input is 1
C. all inputs are 1 **D. all inputs are 0**

**76.** The Boolean expression for a NOR gate is
A. X = A + B **B. X = NOT(A + B)**
C. X = A.B D. X = NOT(A.B)

**77.** A simple burglar alarm circuit can be made using an
A. NOT gate only B. NOR gate only
C. OR gate **D. AND gate**

**78.** In a burglar alarm using an AND gate, the alarm is activated when
A. any one is ON
B. both are OFF
**C. both the sensor and the alarm switch are ON**
D. one is OFF

**79.** In the fire alarm circuit, when the thermistor is warmed by fire, its resistance
**A. falls** B. rises
C. stays constant D. becomes infinite

**80.** Quantum computers use
A. bits only **B. qubits**
C. vacuum tubes D. bytes only

**81.** A qubit can exist in
**A. a superposition of multiple states** B. only state 0
C. no state D. only state 1

**82.** Quantum computers need core components to be cooled to
A. the boiling point of water B. room temperature
**C. almost absolute zero** D. 100 °C