

NOTE:

PLEASE NOTE: THESE ANSWERS ARE FOR REFERENCE PURPOSES ONLY AND MEANT FOR YOUR PRACTICE BEFORE THE MAIN QUIZ.

ملاحظة:

يرجى العلم أن هذه الإجابات للاطلاع فقط، وهي مخصصة لمساعدتكم على الممارسة قبل الاختبار الرئيسي.

1. Twenty cells, each of EMF, 10 volts and the currents is 7 A, are connected in series across an external resistance of 6.5 Ω . Find the internal resistance of the cells

A. 1.1 Ω

Solution:

Given:

- Number of cells **$n = 20$**
- EMF per cell **$E = 10 \text{ V}$** \rightarrow Total EMF = $20 \times 10 = 200 \text{ V}$
- Current **$I = 7 \text{ A}$**
- External resistance **$R = 6.5 \Omega$**
- Internal resistance per cell = **r**
- Total internal resistance = **$20r$**

$$I = \frac{nE}{R + nr}$$

Rearranging to find internal resistance r :

$$nE = I(R + nr)$$

$$nE = IR + Inr$$

$$nE - IR = Inr$$

$$r = \frac{nE - IR}{In}$$

$$r = \frac{nE - IR}{In}$$

$$r = \frac{200 - 45.5}{140}$$

$$r = \frac{154.5}{140}$$

$$r \approx 1.1036\Omega$$

2. Equivalent of Farad is:

A. Coulomb / Volts

3. The current 3 μA can be expressed in powers of 10 as:

A. $3 \times 10^{-6} \text{ A}$

4. What electrical characteristic of intrinsic semiconductor material is controlled by the addition of impurities?

A. Conductivity

By adding impurities, the number of charge carriers increases (electrons or holes), making the semiconductor either **N-type** or **P-type** and significantly improving its ability to conduct current.

5. Central Part of the atom is

A. Nucleus

6. Which of the following is the application of transistors?

A. Amplify weak signals

7. A resistor of $50\ \Omega$ has a potential difference of 100 volts DC, Calculate the power;

A. 200 W

Solution:

$$P = V^2 / R$$

Given:

- $V = 100\text{ V}$
- $R = 50\ \Omega$

$$P = \frac{100^2}{50}$$
$$P = \frac{10000}{50} = 200$$

8. Electrons in which is in the last orbit or shell of an atom are called?

A. Valence Electrons

9. Central Part of the atom is

A. Nucleus

10. Ripple factor of half wave rectifier _____

A. 1.21

11. Which of the following is a conductor

A. Copper

A **conductor** is a material that allows electric current to flow easily through it because it has **a large number of free electrons**.

Copper, aluminum, silver, gold, Iron

12. Unit of conductance is

A. Mho

13. For normal operation of the transistor, the collector diode has to be

A. Reverse-biased

14. The majority carriers in the emitter of a pnp transistor are _____

A. Holes

15. At absolute zero temperature an intrinsic silicon crystal acts like _____

A. An insulator

16. The output voltage of a bridge rectifier is a _____

A. Full-wave signal

17. For a forward-biased diode, the barrier potential _____ as temperature increases.

A. Decreases

18. In a filter circuit, the inductor is used to _____

A. Block AC and pass DC

19. The majority carriers in the emitter of a npn transistor are _____

A. Free electrons

20. In Charging of a capacitor time constant λ is

A. RC

21. Which is the most widely used semiconductor?

A. Silicon

22. Which is the most widely used semiconductor?

A. Silicon

23. Each valence electron in an intrinsic semiconductor establishes a _____

A. Covalent bond

24. In the common collector transistor connection circuit _____

A. Input is applied between the base and collector and output is taken from the emitter and collector

25. Diffusion of free electrons across the junction of an unbiased diode produces _____

A. The depletion layer

26. Which of the following statement is TRUE for a parallel circuit?

A. Voltages are same

27. Which of the following is required to produce p-type semiconductor?

A. Acceptor atoms

28. Equivalent of Farad is:

A. Coulomb / Volts

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

A. A pn junction

30. The current $3\ \mu\text{A}$ can be expressed in powers of 10 as:

A. $3 \times 10^{-6}\ \text{A}$

31. Which of the following statements is incorrect?

A. At room temperature, pure semiconductors make excellent conductors.

32. The numbers of valence electrons for conductors are _____

A. Less than four

Insulator >

Semicondu =

33. What is the barrier potential of a Germanium diode at room temperature?

A. 0.3

34. Which of the following is the application of transistors?

A. Amplify weak signals

35. Efficiency of a half wave rectifier is _____

A. 0.406

36. Unit of Inductance

A. Henry

37. What is the relationship between time period and frequency?

A. Inversely proportional

38. What is the reference voltage of earthing system?

A. Zero voltage

39. The device which removes the a.c part of the rectifier output and allows the d.c part to reach the load is _____

A. Filter

40. Which component can be added to a half-wave rectifier circuit to help smooth the output?

A. Capacitor

41. In a semiconductor, the concept of an energy gap is used to show the difference between the energies of the _____

A. Conduction band electrons and valence electrons

42. When a pn junction is formed, electrons move across the junction and fill holes in the p-region. The filled hole is a _____

A. Negative ion

43. The process of adding impurities to a semiconductor is _____

A. Doping

44. The impurities which produce n-type semiconductors is _____

A. Donor

45. which of following is an application of PN Junction?

A. Transistor

46. _____ is the process of changing alternating current (AC) to direct current (DC).

A. Rectification

47. A potential difference of 22 V is applied across the plates of a capacitor . Find the capacitance if the charge across the capacitor is 50μC.

A. 2.27 μF

$$Q = C \times V$$

Where:

- Q = charge
- C = capacitance
- V = voltage

Rearranging:

$$C = \frac{Q}{V}$$

Given:

- $Q = 50 \mu C = 50 \times 10^{-6} C$
- $V = 22 V$

Substitute:

$$C = \frac{50 \times 10^{-6}}{22}$$
$$C = 2.27 \times 10^{-6} F$$

48. An alternating voltage is represented by $v = 80 \sin 100 t$. Calculate the maximum voltage.

A. 80v

49. The efficiency of a full wave rectifier is _____

A. 0.812

50. 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

51. An alternating voltage is represented by $v = 80 \sin 100 t$. Calculate the frequency value.

A. 15.9 Hz

Given:

$$v = 80 \sin (100t)$$

Here, **100** is the angular frequency ω in rad/s.

 **Relation:**

$$\omega = 2\pi f$$

So,

$$f = \frac{\omega}{2\pi} = \frac{100}{2\pi}$$
$$f = \frac{100}{6.283} \approx 15.9 \text{ Hz}$$

52. An alternating voltage is represented by $v = 80 \sin 100 t$. Calculate the peak to peak voltage.

A. 160 v

53. Which transistor mode gives the inverted output _____

A. Common Emitter

54. When a diode is forward biased, the voltage across it _____

A. Remains approximately the same

55. The term bias means _____

A. A dc voltage is applied to control the operation of a device

56. The emitter current is always _____

A. Greater than the base current and Greater than the collector current

57. How much time is required for 10 coulombs of charge to flow past a point if the rate of flow of charge is 2 amperes?

A. 5 Sec

$$I = Q / t$$

Where:

- I = current (A)
- Q = charge (C)
- t = time (s)

Rearrange for time:

$$t = \frac{Q}{I}$$

Given:

- $Q = 10 \text{ C}$
- $I = 2 \text{ A}$

Substitute:

$$t = \frac{10}{2} = 5 \text{ s}$$

58. How many valence electrons does a Silicon atom have?

A. 4

59. Find the V_m of an alternating voltage represented by $v = 141.4 \sin 377 t$.

A. 141.4 V

60. AN ATOM IS MADE UP OF _____.

- A. PROTONS
- B. NEUTRONS
- C. ELECTRON

61. IN THE COMMON COLLECTOR TRANSISTOR CONNECTION CIRCUIT _____

- A. INPUT IS APPLIED BETWEEN THE BASE AND COLLECTOR AND OUTPUT IS TAKEN FROM THE EMITTER AND COLLECTOR

62. A 500 H COIL AND A 1 H COIL ARE CONNECTED IN SERIES. CALCULATE LT.

A. 501 H

63. HOLES ARE THE MINORITY CARRIERS IN WHICH TYPE OF SEMICONDUCTOR?

A. N-TYPE

64. WHAT IS THE CURRENT FOR 10 V LAMPS HAS A RESISTANCE OF 25 Ω .

A. 0.4 A

SOLUTION:

GIVEN:

- $V = 10 \text{ V}$
- $R = 25 \Omega$

$$I = \frac{10}{25} = 0.4 \text{ A}$$

65. EQUIVALENT OF JOULE IS:

A. WATT*SECOND

66. POTENTIAL DIFFERENCE BETWEEN TWO POINTS IS:

A. VOLTAGE.

67. SIXTEEN CELLS, EACH HAVING AN INTERNAL RESISTANCE OF 4 Ω , WHEN JOINED IN PARALLEL SEND A CURRENT OF 2.72 A THROUGH AN EXTERNAL RESISTANCE OF 0.3 Ω . FIND THE EMF OF EACH CELL.

A. 1.496V

GIVEN:

- NUMBER OF CELLS = 16
- INTERNAL RESISTANCE OF EACH CELL = 4 Ω
- CELLS CONNECTED **IN PARALLEL**

- EXTERNAL RESISTANCE = $0.3\ \Omega$
- CURRENT = 2.72 A

EQUIVALENT INTERNAL RESISTANCE IN PARALLEL

FOR CELLS IN PARALLEL:

$$r_{\text{TOTAL}} = \frac{r}{n}$$

$$r_{\text{TOTAL}} = \frac{4}{16} = 0.25\ \Omega$$

USE THE FORMULA

$$E = I(R + r_{\text{TOTAL}})$$

SUBSTITUTE VALUES:

$$E = 2.72(0.3 + 0.25)$$

$$E = 2.72 \times 0.55$$

$$E = 1.496\text{ V}$$

68. A 0.3 A CURRENT IS FLOWING THROUGH A RESISTANCE OF $100\ \Omega$. FIND THE POWER RATING IN WATTS.

A. 9 W

$$P = I^2 R$$

GIVEN:

- $I = 0.3\text{ A}$
- $R = 100\ \Omega$

SUBSTITUTE:

$$P = (0.3)^2 \times 100$$

$$P = 0.09 \times 100 = 9\text{ W}$$

69. WHAT WOULD BE TYPICAL VALUE FOR THE REVERSE CURRENT IN A SILICON DIODE?

A. A FEW NANOAMPERES

70. DOPING OF A SEMICONDUCTOR MATERIAL MEANS _____

A. THAT IMPURITY ARE ADDED TO DECREASE THE RESISTANCE OF THE MATERIAL

71. AN INDUCTANCE OF 60H INDUCES A CURRENT OF 50 A IN 40 SECOND. HOW MUCH IS THE $\frac{di}{dt}$ RATE OF CURRENT CHANGE IN AMPERES PER SECOND?

A. 1.25 A/S

SOLUTION:

FORMULA:

$$\frac{di}{dt} = \frac{\Delta I}{\Delta t}$$

GIVEN:

- CHANGE IN CURRENT $\Delta I = 50 \text{ A}$
- TIME $\Delta t = 40 \text{ S}$

SUBSTITUTE:

$$\frac{di}{dt} = \frac{50}{40} = 1.25 \text{ A/S}$$

72. IT REQUIRES 400 JOULES OF ENERGY TO TRANSFER A QUANTITY OF CHARGE BETWEEN THE POINTS A AND B AT A POTENTIAL DIFFERENCE OF 20 VOLTS. HOW MUCH CHARGE IS TRANSFERRED?

A. 20 C

SOLUTION:

TO FIND CHARGE, USE:

$$W = Q \times V$$

WHERE:

- W = ENERGY/WORK (J)

- Q = CHARGE (C)
- V = POTENTIAL DIFFERENCE (V)

REARRANGING:

$$Q = \frac{W}{V}$$

GIVEN:

- $W = 400 \text{ J}$
- $V = 20 \text{ V}$

SUBSTITUTE:

$$Q = \frac{400}{20} = 20 \text{ C}$$

73. INTRINSIC SEMICONDUCTORS ARE THOSE WHICH _____

A. ARE MADE OF THE SEMICONDUCTOR MATERIAL IN ITS PUREST FORM

74. THE MAJORITY CARRIERS IN THE EMITTER OF A PNP TRANSISTOR ARE _____

A. HOLES

75. BJT IS A _____

A. CURRENT CONTROLLED DEVICE

76. HOW MANY DIODES IN THE CENTER-TAP FULL WAVE RECTIFIER.

A. 2

77. WHAT IS AN ENERGY GAP?

A. THE SPACE BETWEEN TWO ORBITAL SHELLS

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