PHYSICS

BOOKS - DISHA PUBLICATION PHYSICS (HINGLISH)

SEMICONDUCTOR ELECTRONICS : METERIALS, DEVICES AND SIMPLE CIRCUITS

Jee Main 5 Years At A Glance

1. In a common emitter configuration with suitable bias, it is given that R_L is theload resistance and R_{BE} is small signal dynamic resistance (iiput side). Then, volage gain, current gain and power gain are given , respectively, by :

β is currentgain , I_B, I_C and I_E are respectively base, collector and emitter currents.

A. $\beta\dfrac{R_L}{R_{BE}}, \dfrac{\Delta I_E}{\Delta I_B}, \beta^2\dfrac{R_L}{R_{BE}}$

B. $\beta^2\dfrac{R_L}{R_{BE}}, \dfrac{\Delta I_C}{\Delta I_B}, \beta\dfrac{R_L}{R_{BE}}$

C. $\beta^2 \frac{R_L}{R_{BE}}, \frac{\Delta I_C}{\Delta I_E}, \beta^2 \frac{R_L}{R_{BE}}$

D. $\beta \frac{R_L}{R_{BE}}, \frac{\Delta I_C}{\Delta I_B}, \beta^2 \frac{R_L}{R_{BE}}$

Answer: D

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2. In the given circuit, the current through zener diode is :

A. 2.5mA

B. 3.3mA

C. 5.5mA

D. 6.7 mA

Answer: B

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3. The reading of the ammeter for a silicon diode in the given circuit is :

A. 0

B. 15 mA

C. 11.5 mA

D. 13.5 mA

Answer: C

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4. What is the conductivity of a semiconductor sample having electron concentration of $5 \times 10^{18} m^{-3}$ hole concentration of

$5 \times 10^{19} m^{-3}$, electron mobility of $2.0 m^2 V^{-1} s^{-1}$ and hole mobility of $0.01 m^2 V^{-1} s^{-1}$?

(Take charge of electron as $1.6 \times 10^{-19} C$)

A. $1.68(\Omega - m)^{-1}$

B. $1.83(\Omega - m)^{-1}$

C. $0.59(\Omega - m)^{-1}$

D. $1.20(\Omega - m)^{-1}$

Answer: A

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5. An experiment is performed to determine the 1-V characteristics of $R = 100\Omega$ and a maximum power of dissipation rating of 1W. The minimum voltage range of the DC source in the circuit is :

A. 0-5V

B. 0-24V

C. 0-12V

D. 0-8V

Answer: C

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6. The temperature dependence of resistance of Cu and undoped Si in the temperature range $300 - 400K,$ is best described by :

A. Linear increase for Cu, exponential decrease of Si.

B. Linear decrease for Cu, linear decrease for Si.

C. Linear increase for Cu, linear increase for Si.

D. Linear increase for Cu, exponential increase for Si.

Answer: A

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7. A red LED emits light of 0.1 watt uniformaly around it. The amplitude of the electric field of the light at a distance of 1m from the diode is

A. 5.48 V/m

B. 7.75 V/m

C. 1.73 V/m

D. 2.45 V/m

Answer: D

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8. An n-p-n transistor has three leads A, B and C. Connecting B and C by moist fingers, A to the positive lead of an ammeter, and C to the

negative lead of the ammeter, one finds large deflection. Then, A, B and C refer respectively

A. Emitter, base and collector

B. Base, emitter and collector

C. Base, collector and emitter

D. Collector, emitter and base

Answer: C

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9. Identify the gate and match A, B, Y in bracket to check.

A. AND (A= 1, B= 1, Y= 1)

B. OR (A=1,B= 1, Y=0)

C. NOT (A=1, B=1, Y= 1)

D. XOR (A=0,B=0, Y=0)

Answer: A

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10. The forward biased diode connection is

A. 

B. 

C. 

D. 

Answer: A

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Exercise 1 Concept Builder Topicwise

1. In semiconductor at a room temperature

A. the conduction band is completely empty

B. the valence band is partially empty and the conduction band is partially filled

C. the valence band is completely filled and the conduction band is partially filled

D. the valence band is completely filled

Answer: C

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2. An electric field us applied to a semiconductor.Let the number of charge carriers be n and the average drift speed be v.If the temperature is increased,

A. both n and v will increase

B. n will increase but v will decrease

C. v will increase but n will decrease

D. both n and v will decrease

Answer: B

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3. When on impurity is doped into an intrinsic semiconductor, the conductivity of the semiconductor

A. increases

B. decreases

C. remains the same

D. becomes zero

Answer: C

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4. A solid which is not transperent to visible light and whose conductivily increase with temperature is formed by

A. ionic bonding

B. metallic bonding

C. covalent bonding

D. vander Wall bonding

Answer: B

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5. The electrical conductivity of pure germanium can be increased by

A. increasing the temperature

B. doping acceptor impurities

C. doping donor impurities

D. all of the above

Answer: D

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6. The mobility of free electrons is greater then that of free holes because

A. they are light

B. they carry negative charge

C. they mutually colllide less

D. they require low energy to continue their motion

Answer: A

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7. If the two ends of a p-n junction are joined by a wire ,

A. there will not be a steady current in the circuit

B. there will be a steady current from the n-side to the p- side

C. there will be a steady current from the p-side to the n -side

D. there may or may not be a current depending upon the resistance of the connecting wire

Answer: A

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8. The diffusion current in a p-n junction is

A. from the n-side to the p-side

B. from the p-side to the n-side

C. from the n-side to the p-side if the junction is forward biased and in the opposite direction if it is reverse-biased

D. from the p-side to the n-side if the junction is forward biased and in the

opposite direction if it is reverse-biased

Answer: B

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9. Lets n_p and n_e be the number of holes and conduction electrons in an extrinsic semiconductor.

A. $n_p > n_e$

B. $n_p = n_e$

C. $n_p < n_e$

D. $n_p \neq n_e$

Answer: D

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10. In the half wave rectifier circuit operating from 50 Hz mains frequency, the fundamental frequency in the ripple would be

A. 25 Hz

B. 50 Hz

C. 70.7 Hz

D. 100 Hz

Answer: B

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11. In a half wave rectifier, the r.m.s value of the A.C. component of the wave is

A. equal to d.c. value

B. more than d.c. value

C. less than d.c. value

D. zero

Answer: B

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12. The average value of output direct current in a full wave rectifier is

A. I_0 / π

B. $I_0/2$

C. $\pi I_0/2$

D. $2I_0/\pi$

Answer: D

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13. Carbon, silicon and germanium atoms have four valence electrons each. Their valence and conduction bands are separated by energy band gaps represented by $(E_g)_C$, $(E_g)_{Si}$ and

$(E_g)_{Ge}$, respectively. Which one of the following relationship is true in their case?

A. $(E_g)_C > (E_g)_{Si}$

B. $(E_g)_C < (E_g)_{Si}$

C. $(E_g)_C = (E_g)_{Si}$

D. $(E_g)_C < (E_g)_{Ge}$

Answer: A

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14. If an ideal junction diode is connected as shown, then the value of the current I is

A. 0.013A

B. 0.02A

C. 0.01 A

D. 0.1A

Answer: C

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15. Which is the correct diagram of a half-wave rectifier

A. 

B. 

C. 

D. 

Answer: B

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16. In a p-type semiconductor the acceptor level is situated 60 m eV above the valence band. The maximum wavelength of light required to produce a hole will be [use hc $= 12400eV\text{Å}]$.

A. $0.207 \times 10^{-5}m$

B. $2.07 \times 10^{-5}m$

C. $20.7 \times 10^{-5}m$

D. $2075 \times 10^{-5}m$

Answer: B

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17. For bidden gap for insulators is

A. $\geq 6eV$

B. $\leq 1eV$

C. $\leq 3eV$

D. $\cong 0eV$

Answer: A

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18. Copper, a monovalent, has molar mass 63.54 g/mol and density $8.96 g / cm^3$. What is the number density n of conduction electron in copper?

A. $1.1 \times 10^{26} m^{-1}$

B. $2.8 \times 10^{25} m^{-1}$

C. $8.49 \times 10^{28} m^{-1}$

D. None of these

Answer: C

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19. An LED is constructed from a p-n junction based on a certain Ga-As-P semiconducting material whose energy is 1.9 eV. What is the wavelength of the emitted light?

A. 150 nm

B. 350 nm

C. 500 nm

D. 650 nm

Answer: D

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20. In a photodiode,the conductivity increases when the material is exposed to light.It is found that the conductivity changes only if the wavelength is less than 620nm.What is the band gap?

A. 1.0 eV

B. 3.2 eV

C. 6eV

D. 2.0 eV

Answer: D

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21. The energy gap of silicon is 1.14 eV. Find the maximum wavelenth at which silicon starts energy absorption.

A. 10.888Å

B. 108.88Å

C. 1088.8Å

D. 10888Å

Answer: A

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22. On doping germanium with donor atoms of density $10^{17}cm^{-3}$, find its conductivity in mho/cm, if $\mu = 3800cm^2/V - s$.

A. 30.4

B. 60.8

C. 91.2

D. 121.6

Answer: B

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23. The ratio of electron and hole currents in a semiconductor is 7/4 and the ratio of drift velocities of electrons and holes is 5/4, then

the ratio of concentrations of electrons and holes will be

A. $5/7$

B. $7/5$

C. $25/49$

D. $49/25$

Answer: B

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24. What is the conductivity of a semiconductor (in $\Omega^{-1}m^{-1}$) if electron density $= 5 \times 10^{12} cm^{-3}$ and hole density $= 8 \times 10^{13} cm^{-3}$?

$\left(\mu_e = 2.3 V^{-1} s^{-1} m^2, \mu_h = 0.01 m^2 V^{-1} s^{-1}\right)$

A. 5.634

B. 1.968

C. 3.421

D. 8.964

Answer: B

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25. If the ratio of the concentration of electron to that of holes in a semiconductor is $\frac{7}{5}$ and the ratio of current is $\frac{7}{4}$ then what is the ratio of their drift velocities ?

A. $\frac{5}{8}$

B. $\frac{4}{5}$

C. $\frac{5}{4}$

D. $\frac{4}{7}$

Answer: C

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26. In germanium the energy gap is about 0.75 eV. The wavelength of light which germanium starts absorbing is

A. 5000 Å

B. 1650Å

C. 16500Å

D. 165000Å

Answer: C

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27. A potential barrier of 0.3 V exists across a p-n junction. An electron with speed 5×10^5 m/s approaches this p-n junction from n-side, what will be its speed on entering the p-side?

A. $3 \times 10^5 m/s$

B. $3.8 \times 10^5 m/s$

C. $5 \times 10^5 m/s$

D. $2.6 \times 10^3 m/s$

Answer: B

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28. To use a transistor as an amplifier

A. the emitter base junction is forward biased and the base collector junction is reverse biased

B. no bias voltage is required

C. both junctions are forward biased

D. both junctions are reverse biased.

Answer: A

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29. Current gain of a transistor in common base mode is 0.95. Its value in coinmon emitter mode is

A. 0.95

B. 1.5

C. 19

D. $(19)^{-1}$

Answer: C

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30. A transistor has three impurity regions , emitter , base and collector. Arrange them in order of increasing doping levels.

A. emitter, base and collector

B. collector, base and emitter

C. base, emitter and collector

D. base, collector and emitter

Answer: D

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31. In a common-base amplifier, the phase difference between the input signal voltage and output voltage is :

A. 0

B. $\frac{\pi}{4}$

C. $\pi / 2$

D. π

Answer: A

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32. The current gain β may be defined as

A. the ratio of change in collector current to the change in emitter current for a constant collector voltage in a common base arrangement.

B. the ratio of change in collector current to the change in the base current at constant collector voltage in a common emitter circuit

C. the ratio of change in emitter current to the change in base current for constant

emitter voltage in common emitter circuit.

D. the ratio of change in base current to the change in collector current at constant collector voltage in common emitter circuit.

Answer: B

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33. When n-p-n transistor is used as an amplifier

A. electrons move from collector to emitter

B. electrons move from emitter to collector

C. electrons move from collector to base

D. holes move from emitter to collector

Answer: B

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34. Which of the following relation holds true regardless of circuit configuration or transistor type : [I_E - emitter current, I_C= collector current, I_B = base current]

A. $I_E = I_C + I_B$

B. $I_E + I_C = I_B$

C. $I_C + I_B > , I_E$

D. $I_C = I_B < I_E$

Answer: A

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35. If the given transistor is used as an amplifier then for input resistance of 80Ω and load resistance of 16Ω, the output voltage corresponding to the input voltage of 12mV will be

A. 37.5 mV

B. 37500V

C. 300 V

D. 300mV

Answer: C

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36. When the base current in a transistor is changed from $30\mu A$to $80\mu A$,the collector current is changed form 1.0 mA to 3.5 mA. Find the current gainβ.

A. 30

B. 40

C. 45

D. 50

Answer: D

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37. A transistor is connected in common emitter configuration. The collector supply is 8V and the voltage drop across a resistor of 800Ω in the collector circuit is 0.5 V. If the current gain factor (α) is 0.96, find the base current.

A. $5\mu A$

B. $6\mu A$

C. $20\mu A$

D. $26\mu A$

Answer: D

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38. A pnp transistor is used in common-emitter mode in an amplifier circuit. A change of $40\mu A$ in the base current brings a change

of 2 mA in collector current and 0.04 V in base emitter voltage. If a load of $6k\Omega$ is used, then also find the voltage gain of the amplifier.

A. 1

B. 50

C. 300

D. 900

Answer: C

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39. In a npn transistor 10^{10} electrons enter the emitter in 10^{-6} s. 4% of the electrons are lost in the base.

The current transfer ratio will be

A. 0.98

B. 0.97

C. 0.96

D. 0.94

Answer: C

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40. The current gain α of a transistor in common base mode is 0.995 . Its gain .. in the common emitter mode is

A. 197

B. 201

C. 198

D. 199

Answer: D

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41. A working transitor with its three legs marked P, Q and R is tested using a multimeter No conduction is found between $P, Q$by connecting the common (negative) terminal of the multimeter to $R$and the other (positive) terminal to or Q some resistance is seen on the multimeter . Which of the following is true for the transistor ?

A. It is an npn transistor with R as base

B. It is a pnp transistor with R as collector

C. It is a pnp transistor with R as emitter

D. It is a pnp transistor with R as base

Answer: D

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42. A transistor has $\beta = 40$. A change in base current of $100\mu A$, produces change in collector current

A. 40×100 microampere

B. (100-40) microampere

C. (100+40) microampere

D. 100/40 microampere

Answer: A

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43. A transistor has a base current of 1 mA and emitter current 90 mA. The collector current will be

A. 90 mA

B. 1 mA

C. 89 mA

D. 91 mA

Answer: C

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44. In a common emitter transistor amplifier, $\beta = 60, R_0 = 5000\Omega$ and internal resistance

of a transistor is 500Ω. The voltage amplification of the amplifier will be

A. 500

B. 460

C. 600

D. 560

Answer: C

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45. The current gain in transistor in common base mode is 0.99. To change the emitter current by 5 mA, the necessary change in collector will be

A. 0.196 mA

B. 2.45 mA

C. 4.95 mA

D. 5.1 mA

Answer: C

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46. In a transistor, the change in base current from $100\mu A$ to$125\mu A$causes a change in collector current from 5 mA to 7.5 mA, keeping collector-to-emitter voltage constant at 10V. What is the current gain of the transistor?

A. 200

B. 100

C. 50

D. 25

Answer: B

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47. The output of a $NAND$ gate is 0

A. if both inputs are 0

B. if one input is 0 and the other input is 1

C. if both inputs are 1

D. either if both inputs are l or if one of the inputs is 1 an other 0

Answer: C

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48. What is the value of A.C + A.B.C where A, B and C are inputs?

A. A.C

B. A.B

C. A

D. B

Answer: A

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49. The output of an OR gate is connected to both the inputs of a NAND gate. The combination will serve as a

A. NOT gate

B. NOR gate

C. AND gate

D. OR gate

Answer: B

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50. When the two inoputs of a NAND gate are shorted, the resulting gats is

A. NOR

B. OR

C. NOT

D. AND

Answer: C

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51. Digital circuit can be made by repetitive use of

A. AND gate

B. OR gate

C. NOT gate

D. NAND gate

Answer: D

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52. $NAND$ and NOR gates are called universal gates because they

A. are available universally

B. can be combined to produce OR, AND and NOT gates

C. are widely used in Integrated circuit packages

D. are easiest to manufacture

Answer: B

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53. To get an output 1 from the circuit shown in the figure, the input must not be

A. A=0,B=0, C=1

B. A=1, B=0, C=0

C. A=1, B=0, C=1

D. A=1, B-1,C=0

Answer: A

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54. The correct option for getting X = 1 from the given circuit is:

A. A=B=C=1

B. A = B = 1 & C = 0

C. A = C = 1 & B = 0

D. A = 0 & B = C = 1

Answer: B

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55. The following circut represents

A. OR gate

B. XOR gate

C. AND gate

D. NAND gate

Answer: B

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56. The diagram of a logic circuit is given below. The output F of the circuit is

represented by

A. W.(X+Y)

B. W.(X.Y)

C. W+(X.Y)

D. W+(X+Y)

Answer: C

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Exercise 2 Concept Applicator

1. The intrinsic conductivity of germanium at 27° is 2.13 mho m^{-1} and mobilities of electrons and holes are 0.38 and $0.18 m^2 V^{-1} s^{-1}$ respectively. The density of charge carriers is

A. $2.37 \times 10^{19} m^{-3}$

B. $3.28 \times 10^{19} m^{-3}$

C. $7.83 \times 10^{-19} m^{-3}$

D. $8.47 \times 10^{19} m^{-3}$

Answer: A

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2. A diode having potential difference $0.5V$ across its junction which does not depend on current, is connected in series with resistance of 20Ω across source. If $0.1A$ passes through resistance then what is the voltage of the source?

A. 1.5V

B. 2.0V

C. 2.5 V

D. 5V

Answer: C

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3. The time variations of signals are given as in A, B and C. Point out the true statement from the following:

A. A, B and Care analogue signals

B. A and B are analogue, but C is digital signal

C. A and Care digital, but B is analogue signal

D. A and Care analogue, but B is digital signal

Answer: D

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4. In a p-type semiconductor the acceptor level is situated 60 m eV above the valence band. The maximum wavelength of light required to produce a hole will be [use hc $= 12400eV\text{Å}$].

A. $0.207 \times 10^{-5}m$

B. $2.07 \times 10^{-5}m$

C. $20.7 \times 10^{-5}m$

D. $2075 \times 10^{-5}m$

Answer: B

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5. A 2V battery is connected across AB as shown in the figure. The value of the current supplied by the battery when in one case battery's positive terminal is connected to A and in other case when positive terminal of battery is connected to B will respectively be:

A. 0.4 A and 0.2 A

B. 0.2 A and 0.4 A

C. 0.1 A and 0.2 A

D. 0.2 A and 0.1 A

Answer: A

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6. The current-voltage characteristic of an ideal p-n junction diode is given by

$i = i_0(e^e V / kT - 1)$

where the drift current $i_0$equals $10(\mu)A$.Take the temperature T to be 300K.(a)Find the voltage $v_0$for which $e^{eV/kT} = 100$.One can

neglect the term 1 for vlatages greater than this value (b)Find an expression of the dynamic resistance of the diode as a function of V for $V > V_0$.(c)Find the voltage for which the dynamic resistance is $2.0(\Omega)$

A. 0.12 V

B. 0.5V

C. 0.25V

D. 1.5V

Answer: A

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7. An n-p-n transistor in a common-emitter mode is used as a simple voltage-amplifier with a collector current of 4 mA. The terminals of a 8 V battery is connected to the collector through a load-resistance R_L and to the base through a resistance R_B. The collector-emitter voltage $V_{CE} = 4V$, the base-emitter voltage $V_{BE} = 0.6V$ and the current amplification factor $\beta_{dc} = 100$. Then

A. $185k\Omega, 1K\Omega$

B. $175k\Omega, 2k\Omega$

C. $155k\Omega, 3k\Omega$

D. $125k\Omega, 5k\Omega$

Answer: A

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8. A sinusoidal voltage of peak value 200 volt is connected to a diode and resistor R in the circuit shown so that halfwave rectification occurs. If the forward resistance of the diode

is negligible compared to R, ther.m.s. voltage (in volt) across R is approximately

A. 200

B. 100

C. $\frac{200}{\sqrt{2}}$

D. 280

Answer: B

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9. The number density n, of conduction electrons in pure silicon at room temperature is about $10^{16} m^{-3}$. Assume that, by doping the silicon lattice with phosphorus, we want to increase this number by a factor of a million $\left(10^{6}\right)$. What fraction of $\left(\frac{n_p}{n_{Si}}\right)$ silicon atoms must we replace with phosphorus atoms? (Recall that at room temperature, thermal agitation is so effective that essentially every phosphorus atom donates its "extra" electron to the conduction band) given density of silicon $= 2.33x10^{3}$.

A. $\frac{1}{2 \times 10^5}$

B. $\frac{2}{3 \times 10^5}$

C. $\frac{8}{6 \times 10^4}$

D. $\frac{1}{5 \times 10^6}$

Answer: D

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10. What are the reading of the ammeters A_1 and A_2 shown in figure (Assuming diodes

and ammeters are ideal)

A. 0,0.2 A

B. 0.2A, 0

C. 0.2 A, 0.2A

D. 0.1 A, 02 A

Answer: A

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11. If the forward voltage in a semiconductor diode is changed from 0.5V to 0.7 V, then the forward current changes by 1.0 mA. The forward resistance of diode junction will be

A. 100Ω

B. 120Ω

C. 200Ω

D. 240Ω

Answer: C

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12. A Zener diode is connected to a battery and a load as show below:

The currents, I, I_Z and I_L are respectively.

A. 15 mA, 5 mA, 10 mA

B. 15 mA, 7.5 mA, 7.5 mA

C. 12.5 mA, 5 mA, 7.5 mA

D. 12.5 mA, 7.5 mA, 5 mA

Answer: D

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13. Figure shows a circuit in which three identical diodes are used. Each diode has forward resistance of 20Ω and infinite backward resistance. Resistors $R_1 = R_2 = R_3 = 50\Omega$. Battery voltage is 6 V. The current through R_3 is :

A. 50 mA

B. 100 mA

C. 60mA

D. 25 mA

Answer: A

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14. Two identical pn junctions may be connected in series, with a battery in three ways as shown in figure. The potential drops

across the two pn junctions are equal in

A. circuit 1 and circuit 2

B. circuit 2 and circuit 3

C. circuit 3 and circuit 1

D. circuit 1 only

Answer: B

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15. The current transfer ratio β of a transistor is 50. The input resistance of the transistor when used in common emitter mode is 1 kilo ohm. The peak value of the collector alternating current for an input peak voltage of 0.01 volt is

A. $100\mu A$

B. $01mA$

C. $25mA$

D. $500\mu A$

Answer: D

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16. A Si diode (p-n junction) is connected to a resistor and a biasing battery of variable voltage V_B. Assume that the diode requires a minimum current of 1 mA to be above the knee point 0.7 V of its V-I characteristic curve. Also assume that the voltage V across the diode is independent of current above the knee (cut-off) point If V_B = 5V, then the maximum value

of R so that the voltage V is above the knee point voltage, should be

A. 0.7Ω

B. $4.3k\Omega$

C. $5k\Omega$

D. 5.7Ω

Answer: B

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17. A transistor is operated in common emitter configuration at $V_c = 2V$ such that a change in the base current from $100\mu A$ to $300\mu A$ produces a change in the collector current from $10mA$ to $20mA$. The current gain is

A. 50

B. 75

C. 100

D. 25

Answer: A

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18. The combination of gates shown below yields

A. OR gate

B. NOT gate

C. XOR gate

D. NAND gate

Answer: A

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19. Pure Si at 500 K has equal number of electron (n_e) and hole (n_h) concentrations of $1.5 \times 10^{16} \mathrm{m}^{-3}$. Doping by indium increases n_h to $4.5 \times 10^{22} \mathrm{m}^{-3}$. The doped semiconductor is of

A. n-type with electron concentration $n_e = 5 \times 10^{22} m^{-3}$

B. p-type with electron concentration

$$n_e = 2.5 \times 10^{10} m^{-3}$$

C. n-type with electron concentration

$$n_e = 2.5 \times 10^{23} m^{-3}$$

D. p-type having electron concentration

$$n_e = 5 \times 10^{9} m^{-3}$$

Answer: D

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20. Two ideal diodes are connected to a battery as shown in the circuit. The current supplied by the battery is

A. 0.75 A

B. zero

C. 0.25 A

D. 0.5A

Answer: D

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21. In a CE transistor amplifier, the audio signal voltage across the collector resistance of $2k\Omega$ is $2V$. If the base resistance is $1k\Omega$ and the current amplification of the transistor is 100, the input signal voltage is:

A. 0.1V

B. 1.0V

C. 1mV

D. 10 mV

Answer: D

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22. Transfer characteristics [output voltage (V_0) vs input voltage (V_1)] for a base biased transistor in CE configuration is as shown in the figure. For using transistor as a switch, it is used

A. in region (III)

B. both in region (I) and (III)

C. in region (II)

D. in region (I)

Answer: B

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23. Truth table for system of four NAND gates as shown in figure is

A. 

B. 

C. 

D. 

Answer: A

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24. The figure shows a logic circuit with two inputs A and B and the output C. The voltage wave forms across A, B and Care as given. The

logic gate circuit is:

A. OR gate

B. NOR gate

C. AND gate

D. NAND gate

Answer: A

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25. The input resistance of a silicon transistor is 100Ω. Base current is changed by $40\mu A$ which results in a change in collector current by $2mA$. This transistor is used as a common-emitter amplifier with a load resistance of $4k\Omega$. The voltage gain of the amplifier is

A. 2000

B. 3000

C. 4000

D. 1000

Answer: A

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