# Electronic Devices Test I

**Number of Questions: 35** **Time: 90 min.**

***Directions for questions 1 to 35:*** Select the correct alternative from the given choices.

**1.** The Haynes-Shockly experiment enables one to determine the
(A) mobility of the minority charge carriers.
(B) diffusion co-efficient of majority carriers
(C) Hall co-efficient
(D) life time of the majority carriers

**2.** A long specimen of $n^+$-type semiconductor material
(A) is +vely charged (B) is –vely charged
(C) is electrically neutral (D) None of these

**3.** A zener diode works on the principle of
(A) thermionic emission
(B) hopping of charge carriers across the junction
(C) diffusion of charge carriers across the junction
(D) avalanche multiplication

**4.** Under high electric field, in a semiconductor with decreasing electric field
(A) the mobility of charge carriers decreases
(B) the mobility of charge carriers increases
(C) the velocity of the charge carriers saturates
(D) the velocity of the charge carriers increases

**5.** For a certain transistor, $I_B$ = 25μA, $I_C$ = 2.5mA and β = 75, then the value of $I_{CBO}$ is ______ .
(A) 0.625 mA (B) 0.82 mA
(C) 8.22 μA (D) 7.5 μA

**6.** In a material, the Fermi level is located between the center of the forbidden band and the valance band. Then what is that material?
(A) an *n*-type semiconductor
(B) *a p*-type semiconductor
(C) *a* $p^+$-type semiconductor
(D) an $n^+$-type semiconductor

**7.** A piece of material that is 10cm wide and 12cm long and 0.05 mm thick has a dielectric strength of 10kV/mm. If it is placed between two cu plates and subjected to an increasing voltage, it will breakdown at
(A) 1kV (B) 0.5kV
(C) 1.5kV (D) 1.2kV

**8.** In the fabrication of a buried p-n-p transistor, the processes involved are
1. oxidation 2. epitaxy
3. diffusion 4. photo lithography
The correct sequence in which these processes are to be carried out, is
(A) 4, 1, 2, 3 (B) 4, 1, 3, 2
(C) 1, 2, 3, 4 (D) 1, 4, 3, 2

**9.** In the fabrication of *n-p-n* transistor in an *IC*, the buried layer on the *p*-type substrate is
(A) $p^+$ – doped
(B) $n^+$ – doped
(C) used to reduce the parasitic capacitance
(D) None of these

**10.** Two pure specimen of a semiconductor materials are taken, one is doped with $10^{15}$ cm$^{-3}$ number of donors and the other is doped with $10^{18}$ cm$^{-3}$ number of acceptors. The minority carrier density in the second specimen is $10^8$ cm$^{-3}$. What is the minority carrier density in the other specimen?
(A) $10^{12}$ cm$^{-3}$ (B) $10^{14}$ cm$^{-3}$
(C) $10^{11}$ cm$^{-3}$ (D) $10^{25}$ cm$^{-3}$

**11.** The intrinsic carrier concentration of *Si* sample at 300°K is 2.25 × $10^{16}$ m$^{-3}$. If after doping the number of majority carriers is 4.5 × $10^{19}$ m$^{-3}$, then find the minority carrier density.
(A) 1.125 × $10^{16}$ cm$^{-3}$ (B) 11.25 × $10^{14}$ m$^{-3}$
(C) 2.25 ×$10^{13}$ m$^{-3}$ (D) 1.125 ×$10^{13}$ m$^{-3}$

**12.** If the forward voltage applied to a Si diode at 27°*C* is 0.75V. Find the value of the forward current, if the reverse saturation current is 35nA.
(A) 64.25 mA (B) 45 mA
(C) 55 mA (D) 6.82μA

**13.** For a npn transistor $I_E$ = 3mA, α = 0.97 and $I_{CEO}$ = 1.5 mA, then find $I_C$ value.
(A) 2.75 mA (B) 2.955 mA
(C) 2.9 mA (D) 2.25 mA

**14.** The bonding forces in compound semiconductors, such as GaAsp, arise from
(A) ionic bonding
(B) covalent bonding
(C) metallic bonding
(D) combination of ionic and covalent bonding

**15.** The diffusion diode capacitance of a forward biased $n^+ – p$ junction with a steady current I depends on
(A) width of the depletion region
(B) junction area
(C) mean lifetime of the holes
(D) mean lifetime of electrons

**16.** A *n*-type Ge crystal has a current density of 150 A/m$^2$. The crystal has a resistivity of 0.5Ω–*m* and electron mobility of 0.5 m$^2$/V–S, find the time taken by the electron to travel 15μm in the crystal.
(A) 0.5 μsec (B) 0.4 μsec
(C) 0.25 μsec (D) 0.2 μsec

**17.** Find the reverse saturation current density in an abrupt Si junction. Given the following data:
$N_D = 10^{21}$ m$^{-3}$; $N_A = 10^{22}$ m$^{-3}$; $D_n = 3.4 \times 10^{-3}$ m$^2$/sec;
$D_P = 1.5 \times 10^{-3}$ m$^2$/sec; $L_n = 7.5 \times 10^{-4}$ m;

$L_P = 2.5 \times 10^{-4}$ m; $n_i = 1.5 \times 10^{16}$ m$^{-3}$

(A) $2.323 \times 10^{-7}$ A/m$^2$ (B) 2.23 μA/m$^2$
(C) 2.52 mA/cm$^2$ (D) 3.23 mA/cm$^2$

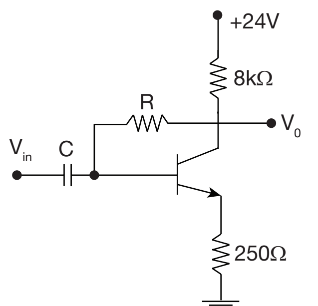
**18.** The Hall coefficient of a specimen of a doped silicon is found to be $3.5 \times 10^{-4}$ m$^3$/C, the resistivity of the specimen is $8.9 \times 10^{-3}$ Ω-m. Find the mobility of charge carriers, assuming single carrier concentration.

(A) 0.28 m$^2$ /V-sec (B) 0.333 m$^2$/V-sec
(C) 3.45 cm$^2$ /V-sec (D) 0.033 m$^2$/V-sec

**19.** If the value of collector current $I_C$ decreases, then the value of $V_{CE}$ is

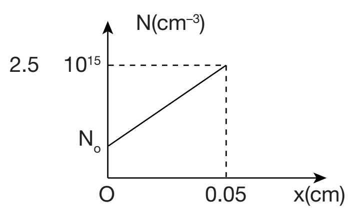
(A) decreases (B) increases
(C) remains the same (D) None of the above

**20.** If the transistor having $V_{CE}$ = 4.5V, $V_{BE}$ = 0.7 V and β = 50, then the value of $R$ is ______.



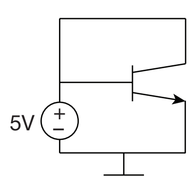

(A) 79.51 KΩ (B) 82 *K*Ω
(C) 87.52 KΩ (D) 63.75 *K*Ω

**21.** In a sample of Ge at room temperature, the electron concentration varies linearly with distance, as shown in figure. The diffusion current density is 0.25 A/cm$^2$ and mobility of electrons is $\mu_n$ = 2400 cm$^2$/V–s, then the electron concentration is




(A) $24.98 \times 10^{13}$ cm$^{-3}$ (B) $2.498 \times 10^{15}$ cm$^{-3}$
(C) $3.24 \times 10^{15}$ cm$^{-3}$ (D) $5.25 \times 10^{14}$ cm$^{-3}$

**22.** In the following circuit transistor is in




(A) cut-off region (B) Active region
(C) saturation (D) inverse active

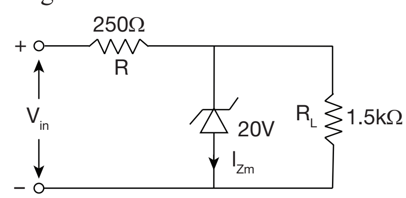
**23.** In a MOS capacitor the oxide voltage exceeds the threshold voltage by 1.5V. If the oxide thickness is 15nm, the charge density in the channel is __________.

(A) 3.45 mC/m$^2$ (B) 0.88 mC/m$^2$
(C) $4.52 \times 10^{-7}$ C/cm$^3$ (D) $3.23 \times 10^{-3}$ C/cm$^2$

**24.** A Si sample is doped with $10^{18}$ Arsenic atoms/cm$^3$. Where is $E_F$ relative to $E_i$?

(A) 0.468eV below the intrinsic Fermi level
(B) 0.468eV above the intrinsic Fermi level
(C) 0.32eV above the conduction band
(D) 0.468eV below the conduction band

**25.** Determine the range of values of $V_{in}$ that will works as the zener regulator.




(consider $I_{zm}$ = 50 mA)

(A) 25 V ≤ $V_{in}$ ≤ 35 V
(B) 23.33 V < $V_{in}$ < 30 V
(C) 23.33 V ≤ $V_{in}$ ≤ 35.83 V
(D) 20 V ≤ $V_{in}$ ≤ 35 V

**26.** The drain of an n-channel MOSFET is shorted to the gate so that $V_{DS} = V_{GS}$. The threshold voltage ($V_{th}$) of MOSFET is 1.25$V$ of the drain current $I_D$ is 1.5mA for $V_{GS}$ = 3V, then for $V_{GS}$ = 1.5V, $I_D$ is

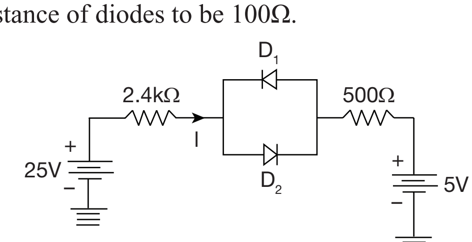
(A) 2.37 mA (B) 3.45μA
(C) 4.23 mA (D) 30.61μA

**27.** Group-I four different semiconductor devices. Match each device in Group-I with its characteristic property in Group-II.

| **Group-I** | **Group-II** |
|---|---|
| *w*. Photo diode | 1. Early effect |
| *x*. MOS capacitor | 2. Coherent radiation |
| *y*. LASER | 3. Flat band voltage |
| *z*. BJT | 4. Dark current |

(A) *w*-4, *x*-2, *y*-3, *z*-1 (B) *w*-2, *x*-3, *y*-2, *z*-4
(C) w-1, *x*-2, *y*-4, *z*-3 (D) *w*-4, *x*-3, *y*-2, *z*-1

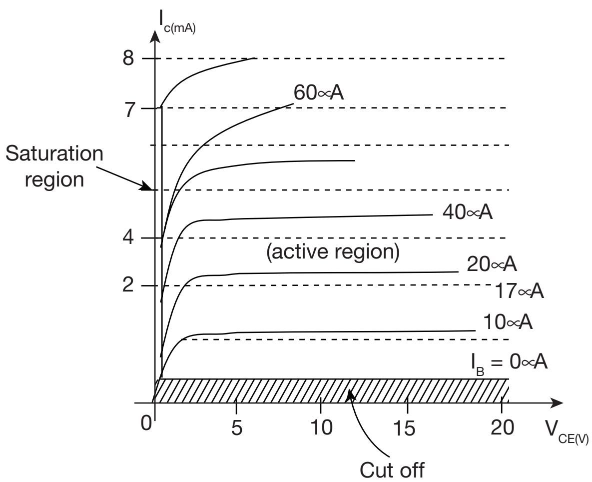
**28.** Determine the current I in the circuit shown in figure. Assume the diodes to be of silicon and forward bias resistance of diodes to be 100Ω.




(A) 5.25 mA (B) 6.433 mA
(C) –4.63 mA (D) 6.9 mA

**29.** A $P$-type Si sample contains a acceptor concentration of $N_a = 10^{20}$ m$^{-3}$. The minority carrier electron lifetime is $\tau_{no} = 15\mu s$. Then the lifetime of the majority carrier is ($n_i = 1.5 \times 10^{10}$ cm$^{-3}$)
(A) $12.32 \times 10^3$ S (B) $3.24 \times 10^3$ S
(C) $1.2 \times 10^3$ S (D) $6.66 \times 10^2$ S

**Data for Questions 30 and 31**
For the common-emitter characteristics of figure shown in below




**30.** Find the dc β at an operating point of $V_{CE}$ = 8V and $I_C$ = 2mA
(A) 120 (B) 99
(C) 110 (D) 117.64

**31.** At $V_{CE}$ = 8V, find the corresponding value of $I_{CEO}$.
(A) 0.237 mA (B) 2.38 μA
(C) 3 μA (D) 2.42 mA

**Data for Questions 32 and 33**
A Si bar 0.5cm long and 120μm$^2$ in cross-sectional area is doped with $10^{16}$ cm$^{-3}$ phosphorus. Consider μ = 1250 cm$^2$/V-s.

**32.** Find the resistance of the Si bar.
(A) 2.08KΩ (B) 4.16 KΩ
(C) 208 KΩ (D) 25.8 KΩ

**33.** Find the current at 800°$K$ with 14$V$ applied.
(A) 50.25mA (B) 6.25 μA
(C) 67.3 μA (D) 3.25mA

**Data for Questions 34 and 35**
For a pn-junction with $N_A = 10^{18}$ cm$^{-3}$ and $N_D = 10^{17}$ cm$^{-3}$, operating at $T$ = 300°K. Consider $n_i = 1.5 \times 10^{10}$ cm$^{-3}$ and $\varepsilon_r = 11.9$.

**34.** The value of $C_{jo}$ per unit junction area (μm$^2$) would be ________ .
(A) $1.25 \times 10^{-14}$ F/(μm)$^2$ (B) 0.936 fF/(μm)$^2$
(C) 9.36 fF/(μcm)$^2$ (D) 1.9 fF/(μm)$^2$

**35.** If grading coefficient m = ½. Find the capacitance $c_j$ at reverse – bias voltage of 2V, assuming a junction area of 2500 μm$^2$.
(A) 1.29 pF (B) 1.52pF
(C) 0.13fF (D) 2.52pF

## Answer Keys

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **1.** A | **2.** C | **3.** B | **4.** B | **5.** C | **6.** B | **7.** B | **8.** D | **9.** B | **10.** C |
| **11.** D | **12.** A | **13.** B | **14.** D | **15.** D | **16.** B | **17.** A | **18.** D | **19.** B | **20.** A |
| **21.** B | **22.** B | **23.** A | **24.** B | **25.** C | **26.** D | **27.** D | **28.** B | **29.** A | **30.** D |
| **31.** A | **32.** C | **33.** C | **34.** B | **35.** A | | | | | |

## Hints and Explanations

**1.** Choice (A)

**2.** Under thermal equilibrium all semiconductors are electrically neutral. i.e.,
∴ total +ve charge = total –ve charge. Choice (C)

**3.** Choice (B)

**4.** $V_d = \mu E$
$\mu \propto \frac{1}{E}$ Choice (B)

**5.** $I_C = \beta . I_B + I_{CEO}$
$2.5 \times 10^{-3} - 75 \times 25 \times 10^{-6} = I_{CEO}$
$I_{CEO} = 0.625$ mA
$I_{CEO} = (1 + \beta).I_{CBO}$
$I_{CBO} = 8.22$ μA Choice (C)

**6.** Choice (B)

**7.** $V = E.d = 10 \times 10^3 \times 0.05$
$= 0.5$ kV Choice (B)

**8.** Choice (D)

**9.** Choice (B)

**10.** $n.p = n_i^2$
$n_1 p_1 = n_2 . p_2$
from the given data
$n_1 = 10^{15}$ cm$^{-3}$
$p_1 = ?$
$n_2 = 10^8$ cm$^{-3}$
$p_2 = 10^{18}$ cm$^{-3}$

$$P_1 = \frac{10^8 \times 10^{18}}{10^{15}} = 10^{11}\,\text{cm}^{-3}$$ Choice (C)

**11.** $n.p = n_i^2$

∴ minority carrier density $= \dfrac{n_i^2}{\text{majority carrier density}}$

$$=\frac{\left(2.25\times10^{16}\right)^2}{4.5\times10^{19}}$$

$= 1.125 \times 10^{13}$ per $m^3$ Choice (D)

**12.** We know $I_D = I_S.\left[e^{\frac{V_D}{\eta V_T}} - 1\right]$ Amp

$$I_D = 35\times10^{-9}\left[e^{\frac{0.75}{2\times0.026}} - 1\right] = 64.25 \text{ mA}$$ Choice (A)

**13.** $I_C = \alpha.I_E + I_{CBO}$

$$I_{CEO} = \frac{1}{1-\alpha}.I_{CBO}$$

$I_{CBO} = (1 - \alpha).I_{CEO} = 45\ \mu A$
$I_C = 0.97 \times 3 \times 10^{-3} + 0.045 \times 10^{-3}$
$= 2.955$ mA Choice (B)

**14.** Intrinsic $S.C \Rightarrow$ covalent bond
GaAsp $\Rightarrow$ combination of covalent and ionic nature
Because difference in the position of $Ga$ and As, $p$.
$Ga \rightarrow$ III[rd] Group element
$P$, As $\rightarrow$ $V^{th}$ Group elements Choice (D)

**15.** $C_D = \frac{\tau.I_f}{\eta V_T}$

$n^+ - p \Rightarrow n$ – side heavily doped
∴ If more depends on the electrons (majority carries)
Choice (D)

**16.** From the given data
$\rho = 0.5\ \Omega$–m
$J = 150$ A/m$^2$
$\mu_n = 0.5$ m$^2$/V–S
$d = 15\ \mu$m

we know speed or velocity $V = \frac{\text{distance}}{\text{time}} = \frac{d}{t}$

$\therefore t = \frac{d}{\upsilon}$

$\vartheta = \mu.E = \mu.J.\rho$
$= \mu.J.\rho = 0.5 \times 150 \times 0.5 = 37.5$ m/sec

$t = \frac{15\times10^{-6}}{37.5} = 0.4\ \mu$ sec Choice (B)

**17.** We know reverse saturation current

$$I_o = A.q\left[\frac{D_n}{L_n.N_A} + \frac{D_p}{L_p.N_D}\right].n_i^2$$

But $J_o = \frac{I_o}{A}$

$$J_o = \left[\frac{3.4\times10^{-3}}{7.5\times10^{-4}\times10^{22}} + \frac{1.5\times10^{-3}}{2.5\times10^{-4}\times10^{21}}\right]$$

$$\times1.6\times10^{-19}\times\left(1.5\times10^{16}\right)^2$$

$= [4.533 \times 10^{-22} + 0.6 \times 10^{-20}] \times 3.6 \times 10^{13}$
$= 2.323 \times 10^{-7}$ A/m$^2$. Choice (A)

**18.** We know

$$\mu = \frac{8}{3\pi}\sigma R_H$$

$$\therefore \sigma = \frac{1}{\rho}$$

$$\mu = \frac{8}{3\pi}\times\frac{3.5\times10^{-4}}{8.9\times10^{-3}} = 0.8488\times\frac{3.5}{89}$$

$= 0.033$ m$^2$/V–sec Choice (D)

**19.** We know
$V_{CC} = I_C R_C + V_{CE} + I_E R_E$
Let $IC \approx I_E$
∴ $V_{CE} = V_{CC} - I_C(R_C + R_E)$
∴ $V_{CE}\uparrow \Rightarrow I_C\downarrow$ Choice (B)

**20.** From the given circuit

$I_E = \frac{24 - 4.5}{8}$ mA = 2.43 75 mA.

Given $\beta = 50$
$V_E = I_E.\ R_E$
$= 2.4375 \times 250\ 10^{-3}$
$V_E = 0.61$ Volts
$V_B = 0.7 + V_E$
$= 1.31$ Volts.
$V_{CE} = 4.5$ V
$V_C = 4.5 + V_E$
$= 5.11$ Volts.
$I_E = (1 + \beta)\ I_B$
$I_B = 47.79\ \mu$A

$$\frac{V_0 - V_B}{R} = I_B$$

$$R = \frac{5.11 - 1.31}{47.79}\times10^6$$

$R = 79.5$ 1k$\Omega$. Choice (A)

**21.** We know

$$J_n = q.D_n.\ \frac{\partial n}{\partial x}$$

But $\frac{D_n}{\mu_n} = V_T$

$D_n = 2400 \times 0.026 = 62.4$ cm$^2$/S

$$0.25 = 1.6\times10^{-16}\times62.4\times\left[\frac{2.5\times10^{15} - N_o}{0.05 - 0}\right]$$

∴ $N_o = 2.5 \times 10^{15} - 1.25 \times 10^{12}$
$= 25 \times 10^{14} - 0.125 \times 10^{13}$
$= 249.875 \times 10^{13}$
$= 24.98 \times 10^{14}$ cm$^{-3}$ Choice (B)

**22.** From the given circuit
Base emitter junction forward bias.
$V_B > V_E$
and collector base junction reverse bias
$V_{CB} = 0$ Choice (B)

**23.** We know
$Q = CV$
$= C_{ox}.[V_{GS} - V_T]$
$$Q = \frac{\varepsilon_{ox}}{T_{ox}}[V_{GS} - V_T]$$
$$= \frac{3.9 \times 8.852 \times 10^{-14}}{15 \times 10^{-7}} \times 1.5$$
$= 3.45 \times 10^{-7}$ C/cm$^2$
$= 3.45 \times 10^{-3}$ C/m$^2$ = 3.45 mC/m$^2$ Choice (A)

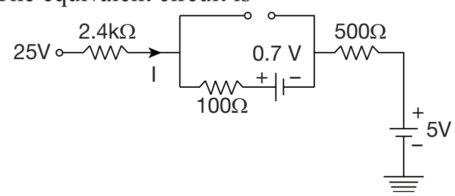
**24.** From the given data Si doped with As.
∴ It is a $n$-type material.
∴ Fermi level above the $E_i$(intrinsic)
$$E_{F_n} - E_i = \frac{KT}{q}\ln\left[\frac{N_D}{n_i}\right]\text{eV}$$
$$= 0.026.\ln\left[\frac{10^{18}}{1.5 \times 10^{10}}\right]\text{eV}$$
= 0.468 eV Choice (B)

**25.** $V_L = V_Z = \frac{R_L.V_{in}}{R + R_L}$
$$V_{i\,\min} = \frac{(R + R_L)}{R_L} V_Z$$
$$= \frac{1750}{1500} \times 20V = 23.33\text{V}$$
$V_{i\,\max} = I_{R\,\max}.\,R + V_Z$
$I_{R\,\max} = I_{zm} + I_L$
= 50mA + 13.33 mA
= 63.33 mA
$V_{i\,\max} = 63.33 \times 10^{-3} \times 250 + 20$
= 35.83 volts Choice (C)

**26.** Given $V_{DS} = V_{GS}$
∴ $V_{DS(\min)} = V_{GS}$
⇒ MOSFET operates in saturation region
⇒ $I_D = k(V_{GS} - V_T)^2$
∴ $I_D$ µ $(V_{GS} - V_T)^2$
$$\frac{I_{D_2}}{I_{D_1}} = \frac{(V_{GS_2} - V_{Tn})^2}{(V_{GS_1} - V_{Tn})^2}$$
$$I_{D2} = \frac{(1.5 - 1.25)^2}{(3 - 1.25)^2} \times 1.5 \times 10^{-3} = 30.61\ \mu\text{A}$$
Choice (D)

**27.** BJT → early effect
LASER ⇒ coherent
mos capacitor ⇒ flat band voltage
photo diode ⇒ dark current Choice (D)

**28.** Let $D_1 \to$ OFF
$D_2 \to$ ON
∴ The equivalent circuit is




$$I = \frac{25 - 0.7 - 5}{3000} = 6.433\text{mA}$$
$I_{D2} \Rightarrow +ve\ D_2 \to$ ON, $D_1 \to$ OFF
Otherwise $D_2 \to$ OFF, $D_1 \to$ ON. Choice (B)

**29.** Minority carrier concentration $(N_D) = \frac{n_i^2}{N_A}$
$$= \frac{(1.5 \times 10^{10})^2}{10^{14}} = 2.25 \times 10^6\ \text{cm}^{-3}$$
The relation between the recombination rates
$$\frac{N_D}{\tau_{no}} = \frac{N_A}{\tau_{po}}$$
$$\tau_{po} = \frac{N_A}{N_D}.\tau_{no}$$
$$\tau_{po} = \frac{10^{14}}{2.25 \times 10^6} \times 15 \times 10^{-6} = 6.66 \times 10^2\ S$$ Choice (A)

**30.** From the given graph
at $V_{CE} = 8$ V and $I_C = 2$ mA
$I_B \approx 17$µA
$$\therefore \beta = \frac{I_C}{I_B} = \frac{2}{17} \times 1000 = 117.64$$ Choice (D)

**31.** $I_{CEO} = (1 + \beta)I_{CBO}$
$= (1 + 117.64) \times 3$µA
= 0.237 mA Choice (A)

**32.** We know $R = \frac{\rho\ell}{A}\Omega$
But $\rho = \frac{1}{q.\mu_n.N_D}$
$$= \frac{1}{1.6 \times 10^{-19} \times 1250 \times 10^{16}} = 0.5\ \Omega - \text{cm}$$
$$R = \frac{0.5 \times 0.5}{120 \times 10^{-12} \times 10^{+4}} = 208.3K\Omega$$ Choice (C)

**33.** $I = \frac{V}{R} = \frac{14 \times 10^{-3}}{208} = 67.3\mu$ Amp Choice (C)

**34.** $C_{jo}$ is the value of $C_j$ obtained for zero applied voltage

$$\therefore C_{jo} = A\sqrt{\frac{\varepsilon_s.q}{2}.\left[\frac{N_A N_D}{N_A + N_D}\right]\times\frac{1}{V_o}}$$

$$V_o = V_T \ln\left[\frac{N_A.N_D}{n_i^2}\right]\text{volts}$$

$$= 0.0259\ln\left[\frac{10^{18}\times10^{17}}{2.25\times10^{20}}\right] = 0.873 \text{ volts}$$

We know $C_{jo} = \frac{\varepsilon_{s.A}}{W}\left[\therefore V_R = OV\right]$

$$W = \sqrt{\frac{2\varepsilon_s}{q}\left[\frac{1}{N_A}+\frac{1}{N_D}\right](V_o + V_R)}$$

$$= \sqrt{\frac{2\times11.9\times8.852\times10^{-14}}{1.6\times10^{-19}}\times\left[\frac{1}{10^{18}}+\frac{1}{10^{17}}\right]\times0.873}$$

$$W = \sqrt{114.95\times10^{5}\times10^{-17}\times1.1} = 11.244\ \mu\text{cm}$$

$$\frac{C_j}{A} = \frac{\varepsilon_S}{W} = \frac{11.9\times8.852\times10^{-12}}{11.244\times10^{-8}}\frac{F}{\text{m}^2}$$

$= 9.36 \times 10^{-4}$ F/m$^2$

$= 9.36 \times 10^{-4} \times 10^{-12}$ F/(μm)$^2$ Choice (B)

**35.** We know general formula for junction capacitance at any $V_R$.

$$C_j = \frac{C_{jo}}{\left(1+\frac{V_R}{V_o}\right)^m}$$

$$= \frac{9.36\times10^{-4}\left(\frac{F}{m^2}\right)\times2500\times10^{-12}\text{ m}^2}{\left(1+\frac{2}{0.873}\right)^{\frac{1}{2}}}$$

$$= \frac{2.34\times10^{-12}}{1.814}$$

$= 1.289 \times 10^{-12}$ F

$= 1.29$ pF Choice (A)