

End-Semester Examination (December-2015)
B. Tech III-Semester (Electrical Engineering)
Electronics & Communication Engineering Department
Subject: Principles of Electronics (EC-1304)

3:00 Hours

Maximum Marks: 60

NOTE: Attempt all the questions and assume the necessary data if required.

- Q. 1 Accurately analyze the voltage-divider bias circuit shown in Fig. 1 to determine the I_C , V_E , V_C , and V_{CE} when (a) $\beta=100$ and (b) $\beta=50$. [8]

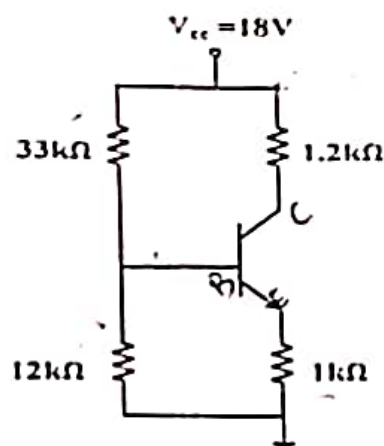
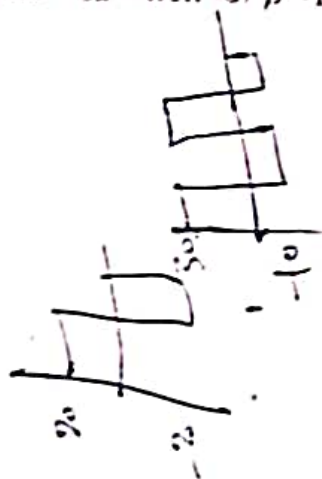


Fig. 1

- Q. 2 (a) Draw the BJT E_c model. [7]
(b) Draw the h-parameter model of CB and CE configurations.

- Q. 3 A silicon p-n diode has a doping of $N_D = 8 \times 10^{15} \text{ cm}^{-3}$ and $N_A = 2 \times 10^{16} \text{ cm}^{-3}$. Determine the followings:

- The depletion width in the n-region
- The depletion width in the p-region
- The built-in potential at 300K
- Calculate the depletion width when it is biased to 0.5V.

For Si: $n_i = 1.5 \times 10^{10} \text{ cm}^{-3}$, $\epsilon_r = 11.9$. [8]

- Q. 4 With the help of energy band-diagram, explain and sketch the characteristic of Tunnel diode? [6]

- Q. 5 Derive and explain the followings:

- Intrinsic carrier concentration (n_i) of a semiconductor. And how the conductivity and resistivity vary with temperature?
- Fermi-energy level (E_f) of an intrinsic semiconductor.

Q. 6 Simplify the given Boolean functions $F(A, B, C, D) = \sum m(0, 2, 3, 5, 7, 8, 10, 11, 14, 15)$ and find the followings:

- (a) Implicants
- (b) Prime implicants
- (c) Essential prime implicants
- (d) Draw the minimized function with only NAND gates

[8]

Q. 7 Convert the following numbers from the given bases to the bases indicated:

- (a) Decimal 225.225 to binary, octal and hexadecimal.
- (b) Binary 11010111.110 to decimal, octal and hexadecimal.
- (c) Octal 623.77 to decimal, octal and binary.
- (d) Hexadecimal 2AC5.D to decimal, octal and binary.

[8]

Q. 8 (a) Explain the operation of JFET and MOSFET
(b) Difference between BJT and MOSFET.

[7]

