* V - 3 0 3 5 *

Printed Pages : 3 **EC – 201**

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 3035 Roll No. | | | | | | | | | | |

B. Tech.

(SEM. II) EXAMINATION, 2006-07

BASIC ELECTRONICS

Time : 2 Hours] *[Total Marks : **50***

Note : *(1) All questions are **compulsory.***
*(2) Assume suitable data wherever **necessary.***

1 Answer any **four** of the following : **3.5×4=14**

(a) Define resistivity, bulb resistance and ohmic contact resistance.

(b) In an n-type Si, the fermi level is 0.3 eV. below the conduction band edge. Find the electron and hole concentrations in Si at room temperature (300 K) (for Si, Eg = 1.1eV, ni = 1.5×10^{10} per cm^3 and h = 8.62×10^{-5} eV/K).

(c) Assuming n= ND^+ show that at very low temperatures, the Fermi level in an n-type semiconductor is given by $E_F = \frac{E_c + E_D}{2} - \frac{KT}{2} \ln\left(\frac{2 N_C}{N_D}\right)$

(d) Differentiate between direct and indirect semiconductors.

(e) The intrinsic carrier concentration for Si at room temperature is $1.5 \times 10^{+10}$ cm^{-3}. The electron mobility for intrinsic silicon is 1350 cm^2/Vs and hole mobility is 480 cm^2/Vs. Calculate the resistivity of intrinsic Si at room temperature.

(f) Show that L_p is the average distance travelled by diffusing carriers before they recombine. The variable L_p represents the distance at which the excess hole concentration falls to 1/e of its value at the point of injection of an n-type semiconductor, (all notations carry standard meaning)

2 Answer any **three** of the following : **5×3=15**

(a) The FB junction of an npn transistor is forward biased by VBF while the collector terminal is left open. What is the value of VCE at this point?

(b) Derive formula for transistor power dissipation. Obtaining this relationship where on the load line you would expect the power dissipation to the maximum?

(c) Describe the differences between r_e and hybrid equivalent model for a BJT.

(d) Derive the expressions for stability of BJT amplifiers.

(e) When a transistor is in saturation and I_B is fixed, show that for small values of V_{CE} (< 0.2V), V_{BE} increases and V_{BC} reduces with increase in V_{CE}.

3 Answer any **three** of the following : **4×3=12**

(a) Convert binary numbers 10111011 and 1101.0110111 into octal numbers.

(b) Convert 3F29 hexadecimal to its decimal equivalent.

(c) What are open-collector gates? Explain.

(d) Elucidate universal gates with the help of suitable example.

(e) How bases are converted in number systems? What will be 2's complement representation of decimal – 14 into its equivalent hexadecimal?

4 Answer any **two** of the following : **4.5×2=9**

(a) Explain, how does the frequency of the input signal to an op.amp affects voltage gain.

(b) Explain chopped and alternate methods of trace development of CROS. How many cycles of a 2-kHZ simusoidal signal are viewed if the sweep frequency is 1kHZ.

(c) Draw circuit diagram of a multimeter and explain its operation in detail.