HTTP://WWW.RGPVONLINE.COM

MEVD-204

M.E./M.Tech. (Second Semester)

EXAMINATION, June 2012

(Grading/Non-Grading)

MICROELECTRONICS

Time: Three Hours

Maximum Marks: GS:70

Note: Attempt any five questions.

1. (a) Explain motion of an electron in electric field.

(b) What do you understand from effective mass? How can you calculate the effective mass of an electron?

2. (a) Derive time-dependent and Time-independent Schrodinger wave equation.

(b) Explain transport phenomena of charge carriers in semiconductor.

3. (a) Write a short note on Boltzmann transport equation.

(b) Explain recombination phenomena of charge carrier. Also explain generation and lifetime of charge carrier.

4. A reverse biased p-n diode has a deletion region of width W, and a voltage of V1 volts across the junction. The n region is uniformly doped. Neglect ϕbi, the built in potential of the junction. What is the voltage required across the diode increase the depletion width to 2W?

5. (a) Explain Elber's Moll model of PNP transistor. How is this useful in getting output characteristics?

(b) Explain different current components in a P-N junction.

6. (a) Explain drift and diffusion current and write the expression for total current density due to holes and electrons.

(b) Explain small signal models for BJT.

7. (a) Derive the Fermi level equation for an intrinsic semiconductor with the energy band diagram.

(b) Derive the equation for the concentrations for holes and electrons.

8. (a) explain in detail the classification of solids with energy band diagram.

(b) Relate and find the minority and majority carrier's concentration in P-N junction diode in unbiased condition.