B.E. / B.Tech DEGREE END SEM EXAMINATIONS, APRIL/ MAY 2012

DEPARTMENT OF ELECTRONICS ENGINEERING

B.E. ECE – II SEMESTER – Regulations 2008

EC 9151 – ELECTRON DEVICES

Time: 3 Hours **Max. Marks:100**

Answer All Questions

Part-A (10 x 2 = 20 marks)

1. Draw the switching characteristics of PN junction diode and define its parameters.
2. A Si p-n junction at T = 300R with zero applied bias has doping concentrations of $N_d = 5 \times 10^6$ cm^{-3} $N_a = 5 \times 10^{15}$ cm^{-3}. Determine the peak electric field in the space charge region of p-n junction.
3. Draw the minority carrier distribution of forward active mode for NPN transistor.
4. Define early effect.
5. Why an N-channel MOSFETs preferred over P-channel MOSFETs ?
6. What is channel length modulation ?
7. Show that a reverse biased p-n junction can be used as a variable capacitor.
8. Compare the Schottky barrier diode and conventional p-n junction diode.
9. Define holding current and latching current of SCR.
10. Compare the VMOS and DMOS.

PART – B (16 x 5 = 80 marks)

11. (i) Derive and explain the expression for ideal voltage-current characteristics of the p-n junction diode. (12)

    (ii) A silicon p-n junction with a cross-sectional area of 10^{-4} cm^2 has the following properties at T = 300K : (4)

n region	p region
$N_d = 10^{17}$ cm^{-3}	$Na = 5 \times 10^{15}$ cm^{-3}
$\zeta_{p0} = 10^{-7}s$	$\zeta_{n0} = 10^{-6}s$
$\mu_n = 850$ $cm^2/V\text{-}s$	$\mu_n = 1250$ $cm^2/V\text{-}s$
$\mu_p = 320$ $cm^2/V\text{-}s$	$\mu_p = 420$ $cm^2/V\text{-}s$

(a) Calculate the reverse saturation current I, and determine the forward-bias current I at a forward-bias voltage of 0.5V.

(b) Determine the ratio of hole current to total current at the space charge edge x_n.