Quiz for Lesson 11,12

Oct. 6, 2015 Electronic Circuits 1 Prof. Woo-Young Choi

Name: ______ Student ID: _____

<u>Prob. 1</u>

Draw a circuit symbol for an NPN transistor. Clearly show the terminal names (E,B,C) and terminal currents with correct current flow directions.

Prob. 2

An NPN bipolar junction transistor is in the forward active region. Which is the largest and which is the smallest among V_E , V_B , V_C ? Assume the base-collector junction is strongly reverse biased.

Prob. 3

Plot I_E , I_B , I_C vs V_{BE} on the same graph for an NPN bipolar junction transistor in the forward active region. Specify their dependence on V_{BE} . Clearly indicate which is the largest and which is the smallest.

<u>Prob. 4</u>

Plot I_E , I_B , I_C vs V_{CE} on the same graph for an NPN bipolar junction transistor in the forward active region. Assume the base-collector junction is strongly reverse biased.

<u> Prob. 5</u>

An NPN bipolar transistor having the collector saturation current of 5×10^{-16} A and β =100 is in the forward active region with V_{BE} = 750mV. Determine I_B, I_C and I_E for this transistor at room temperature. Assume the base-collector junction is strongly reverse biased and V_T=25mV at room temperature. Use exp(30) is approximately 1.0x10¹³.

Prob. 6

Choose the correct description within parentheses in the following sentence: For an NPN transistor in the forward active region, its current gain β becomes larger (a) when N_D for emitter becomes **(larger or smaller)** than N_A for base, or (b) when the base width becomes **(larger or smaller)**. Give very brief explanations.