EASTERN UNIVERSITY, SRI LANKA

SECOND EXAMINATION IN SCIENCE - 2004/2005

FIRST SEMESTER - JANUARY/FEBRUARY 2006

PH 202 - ELECTRONICS I

Answer ALL questions.

Time: One hour

Q1.   Describe the action of a bipolar junction transistor.

Sketch and explain the input and output characteristics curves of a transistor.

A silicon transistor is used in the self biasing arrangement as shown in the diagram below with $V_{CC} = +20V$, $V_{BE} = 0.7$ V, $R_1 = 80$ kΩ, $R_2 = 20$ kΩ, $R_3 = 50$ kΩ, $R_4 = 20$ kΩ, $R_5 = 60$ kΩ and $\beta = 100$. Compute the collector current Ic.
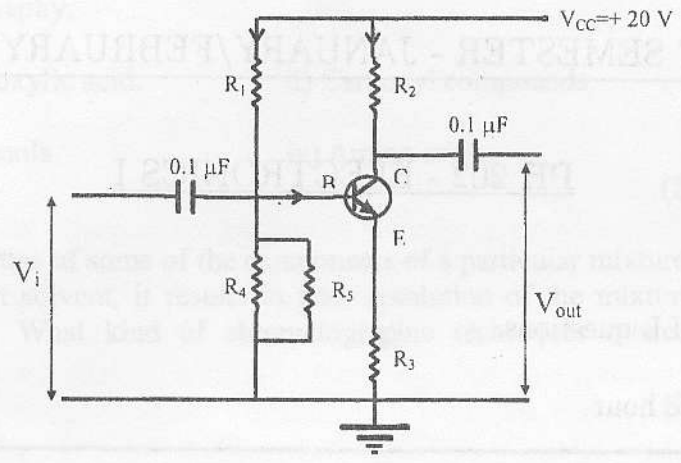
Now a transistor is substituted with $\beta = 150$ into the current. Find the percentage change in I_C

Q2.   By explaining the meaning of intrinsic semiconductors discuss how an intrinsic semiconductor, for example pure silicon, may be converted into

(a) an N-type semiconductor
(b) a P type semiconductor   and

briefly explain the mechanism of electrical conduction in the above two cases.

A narrow germanium bar having a circular cross section area measuring 1 mm diameter is doped with phosphorus of a concentration 10^{20} cm^{-3}. If the mobility of the electron in germanium is 3600 cm^{2}V^{-1}s^{-1} and e $= 1.6 \times 10^{-19}$ C, calculate

(a) the resistivity of the doped semiconductor, and
(b) the length of the bar to provide a total resistance of 5 kΩ.