

國立高雄大學 103 學年度研究所碩士班招生考試試題

科目：電子學
考試時間：100 分鐘

系所：應用物理學系
本科原始成績：100 分

是否使用計算機：是

1. Show the block diagram of a system for converting (1) a 64×8 ROM into a 512×1 ROM (2) a 64×8 ROM into a 256×2 ROM, using a selector/Mux. (20%)
2. Obtain the simplified expressions in sum of products for the following Boolean functions: (20%)
 - (a) $F(A, B, C, D, E) = \Sigma(0, 1, 4, 5, 16, 17, 21, 25, 29)$
 - (b) $F(A, B, C, D, E) = BDE + B'C'D + CDE + A'B'CE + A'B'C + B'C'D'E'$
3. The transistor in Fig. 1 has $\beta = 120$. Plot the voltage transfer characteristics (V_O versus V_I) over the range $0 \leq V_I \leq 5$ V for (a) $R_E = 0$ and (b) $R_E = 1$ K Ω . (20%)
4. Describe an intrinsic semiconductor material and calculate the intrinsic carrier concentration in Gallium arsenide at $T = 300$ °K. (20%)
5. Based on above statement, describe an extrinsic semiconductor material and calculate the thermal equilibrium electron and hole concentrations for considering Gallium arsenide at $T = 300$ °K doped with nitrogen at a concentration of 10^{10} cm $^{-3}$. (10%) What is the type for the semiconductor material? (10%)

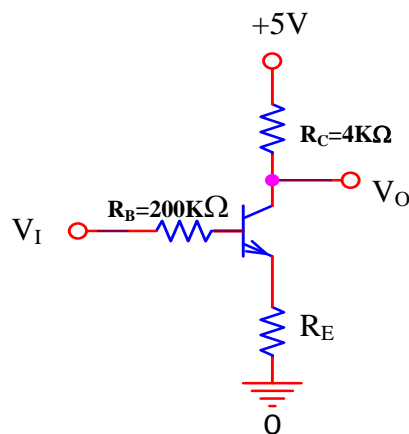


Fig. 1