

國立高雄大學 102 學年度博士班招生考試試題

科目：電子學
考試時間：100 分鐘

系所組別：電機工程學系
本科原始成績：100 分

是否使用計算機：是

1. Explain the mode of operation for MOSFET, and (b) describe small –signal equivalent circuit models of the operating in saturation mode. (20%)
2. For the circuit in Fig. 1, $V_{DD}=10V$, $V_T=2V$, $k(W/L)=1mA/V^2$, $V_{GS}=4V$, and $R_D=3.5k\Omega$.
 - (a) If $R_G=0$, neglect channel length modulation, Find I_D, V_D, g_m and A_v (10%)
 - (b) If exist $R_G=10M\Omega$ and $V_A=50V$, please find A_v and R_{in} . (10%)
3. Please describe the advantage of feedback, and its topologies. (20%)
4. A second-order filter has its poles at $s = -(1/4) \pm j(\sqrt{3}/4)$. The transmission is zero at $\omega = 2$ rad/s and is unity at dc ($\omega= 0$). Please find the transfer function. (20%)
5. Please design a MOSFET current mirror to provide currents of I_o and $I_o/simultaneously$ where I_o is a constant. (20%)

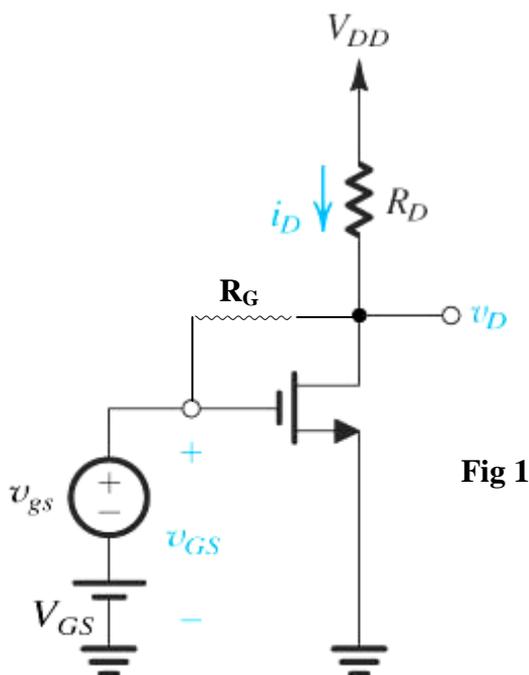


Fig 1

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科目：計算機概論
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以下請用中文作答

1. (20%) (A) Please explain hamming error correction code; (B) What is the corresponding hamming error correction code of the ASCII code of “n” (6E)?
2. (20%) In the studies of information retrieval and image processing, extracting and ranking the significance of data from a large given set is important. Among many available techniques, SVD (singular value decomposition) is effective but inefficient. Explain (A) the main idea of SVD and explain (B) why SVD is not computationally efficient.
3. (20%) In many applications of computers, computing the similarity of two objects is a fundamental and essential task. Let A and B be n -by- n matrices representing the features extracted from two complex objects. Please prove that if B is similar to A , then the two matrices both have the same characteristic polynomial and consequently both have the same eigenvalues.
4. (20%) The study on social network is an emerging research topic. Search for specific relationships in a huge network is a time-consuming task. Therefore, the uses of effective data structures such as tree and graph help improve the search performance. Please prove that looking for an item in a balanced binary tree with n nodes is in $\Theta(\log_2 n)$
5. (20%) Recently, a notable informatics event is the cyber battle caused by the shooting of a Taiwanese fishing boat by the Philippine coast guards. Hackers claim that they deploy DDoS attacks and DNS hijacking via the Internet and successfully paralyze many governmental websites of both countries. Please (A) explain DDoS and DNS hijacking and (B) how to prevent such attacks