

# 大同大學 102 學年度研究所碩士班入學考試試題

考試科目：電路學

所別：電機工程研究所

第 全 頁

註：本次考試 不可以參考自己的書籍及筆記； 不可以使用字典； 可以使用計算器。

1. Using node analysis, find  $V_2$  and  $I_0$  for Fig. 1. (15%)

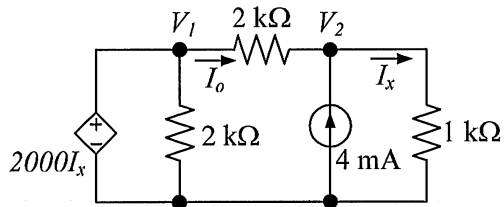


Fig. 1

2. Using mesh analysis, find  $I_x$  and  $V_o$  for Fig. 2. (15%)

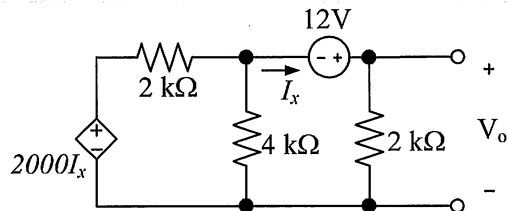


Fig. 2

3. The radio receiver shown in Fig. 3a is connected to an antenna. The antenna intercepts the electromagnetic waves from a broadcast station operating at 1MHz. For circuit analysis purposes, the antenna is represented by a Thevenin equivalent circuit shown in Fig. 3b.

- (a) Find the input impedance  $R_{in} + jX_{in}$  of the receiver if maximum power is to be transferred from the antenna to the receiver. (15%)
- (b) Under the condition of part (a), find the magnitude of the voltage across the receiver terminals and the average power delivered to the receiver. (20%)

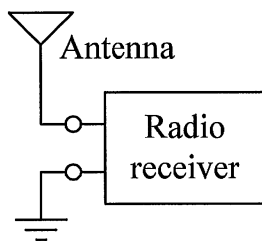


Fig. 3a

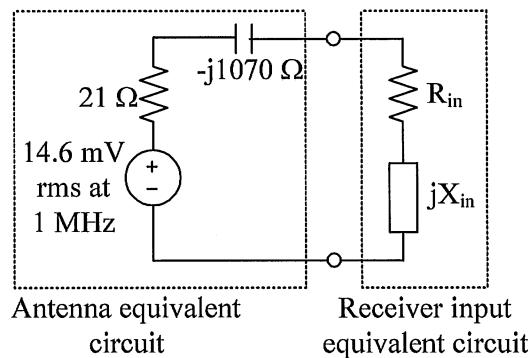


Fig. 3b

4. There are two balanced three-phase loads are connected in parallel and fed by a three-phase line with impedance of  $(0.4+j2.7 \Omega)$  per phase. One of the loads consumes 560 kVA at 0.707 power factor lagging. Another load consumes 132 kW at unity power factor. The voltage at the load end is  $2200\sqrt{3}$  V (line-to-line). Determine (a) the line to line voltage at the source end, (b) the real and reactive power losses of the line, and (c) the total real and reactive power supplied by the source. (25%)
5. The real power delivered by a single-phase source to two impedances,  $Z_1=3+j5 \Omega$  and  $Z_2=10 \Omega$  connected in parallel, is 2000 W. Determine (a) the real power absorbed by each of the impedances and (b) the source current. (10%)