King Fahd University of Petroleum and Minerals
Electrical Engineering Department
EE303 Electronics II
Exam # II

Name:	I.D#	No.	Sec.# 05

5/15

Question No.1

Assuming an ideal op amp.

(a) Drive the transfer function for the second-order low pass filter shown in Fig. 1.

(b) Design the filter such that it exhibits a corner frequency of 100KHz and quality factor of 0.707.

(a) Investigate the possibility of designing the circuit of Fig. 1 to provide a highpass function.

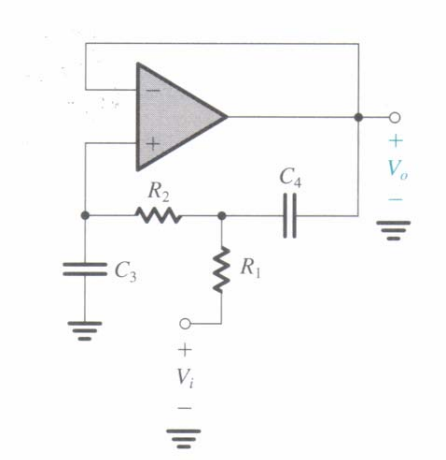

Fig. 1

Question No.2 **4/15**

For the amplifier circuit shown in Fig. 2, the MOSFET is biased such that g_m=1*mA/V, and* r_o=50kΩ .

(a) Which type of feedback topology is incorporated?

(b) Use feedback analysis to find values for Vo/Vs and input and output resistances.

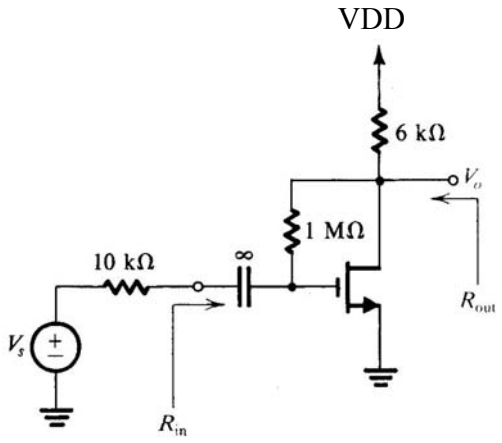

Fig. 2

Question No.3

Consider the circuit shown in Fig. 3. Assume the open loop voltage gain of the opamp $=100V/V$, R_{id}=100kΩ, opamp output resistance=1kΩ, R_S= 10kΩ, R_E=1 kΩ. The transistor is biased with I_E=1mA, its β_F=100, and its r_o=100 kΩ

(a) Which type of feedback topology is incorporated?

(b) Using feedback analysis method find the closed loop gain $\frac{Io}{Vs}$, the input resistance R_{in} (excluding R_s), and output resistance R_{out}. (Recall that the output resistance of a BJT with an emitter resistance RE and a resistance in the base circuit R_B is given by:

$$r_o[1+\frac{g_m R_E}{1+R_B/r_\pi}]$$

(c) For large loop gain, find approximate expressions for the current gain $\frac{Io}{Vs}$, R_{in}, and R_{out}.

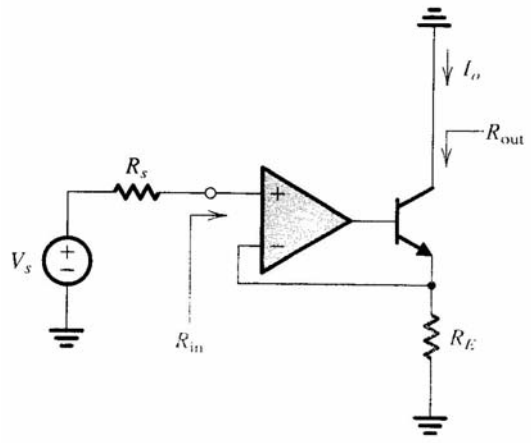

Fig. 3