

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

King Fahd University of Petroleum and Minerals
Department of Electrical Engineering

Semester I 2007/2008

Electronics II EE303

Final Exam

ATTEMPT ALL QUESTIONS
TIME ALLOWED THREE HOURS

Q1. a. Assuming **ideal operational amplifier** sketch the input voltage-output voltage characteristic of the circuit of Fig. 1(a).

b. Assuming **ideal operational amplifier** draw the output voltage waveform of the circuit shown in Fig. 1(b)

c. Assuming **non-ideal operational amplifier** with $I_1 = I_2 = 2\mu A$ and $V_{offset} = 5mV$, calculate the output voltage of the circuit shown in Fig. 1(c).

d. Assuming **non-ideal operational amplifier** with $V_{offset} = 5mV$ and slew rate = $10\mu V/sec$, sketch the output voltage waveform of the circuit shown in Fig. 1(d).

e. Assuming **ideal operational amplifier**, sketch the output waveform of the circuit shown in Fig. 1(e).

Q2. Can the circuit of Fig. 2 oscillate? If your answer is **NO, justify it**. If your answer is **YES then find the condition and frequency of oscillation of the circuit**.

Q3. Consider the circuit shown in Fig. 3 and answer the following questions:

a. Calculate the **input resistance** of the circuit.

b. Calculate the **output resistance** of the circuit.

c. Calculate the **bandwidth** of the circuit.

d. If it is required to **decrease** the output resistance to **half** its value calculated in (b) and to **increase** the input resistance to **double** its value calculated in (a), what modifications can we do to achieve our goal? **On the circuit, show your suggested modifications.**

e. How the modifications in (d) will affect the **bandwidth** calculated in (c).

f. How can we achieve the goals of (d) without affecting the **bandwidth** calculated in (c)? **Just mention what you suggest without any drawings.**

Q4. Design a function (**Sinusoidal/Square/Triangular**) generator. The **square wave** of your circuit is expected to have amplitude in the range of 0 to $\pm 5V$ and frequency in the range of $20Hz - 20kHz$. **No special requirements from the sinusoidal and triangular wave forms.**

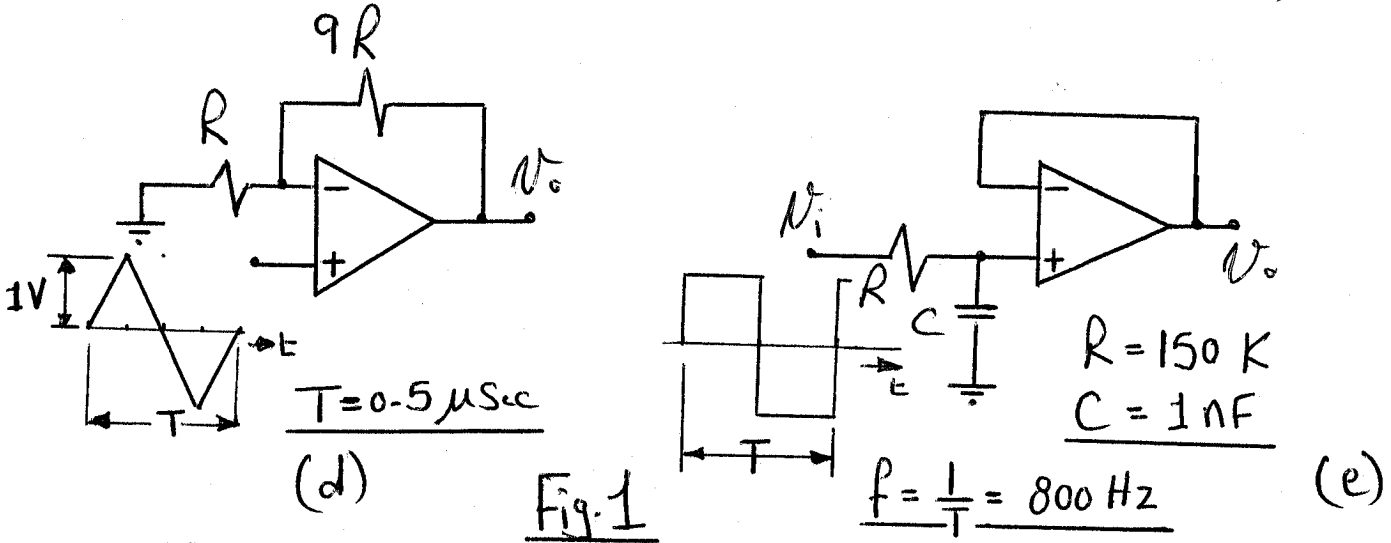
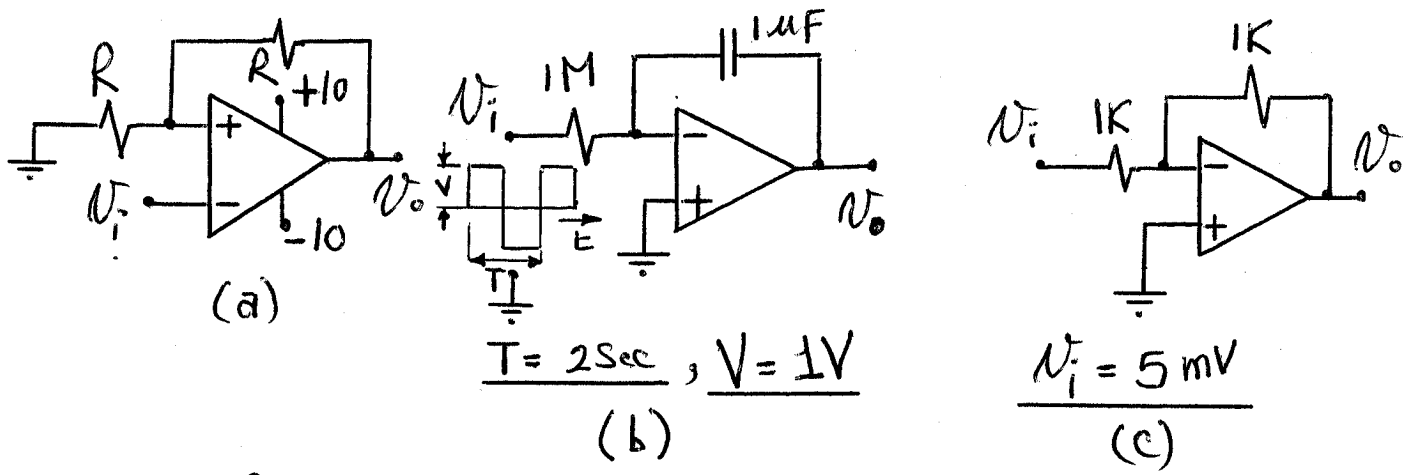


Fig. 1

Fig. 2

