Sohag University
Faculty of Engineering
Electrical Engineering Department

Electric Circuits Theory (2)
Second Year
SHEET NO 1

Q1: Find i_L(in micro amperes) in the circuit in Fig.1

Q2: The op-amp in the circuit in Fig.2 is ideal. Calculate the following: v_1 ,v_o ,i_2 and i_o

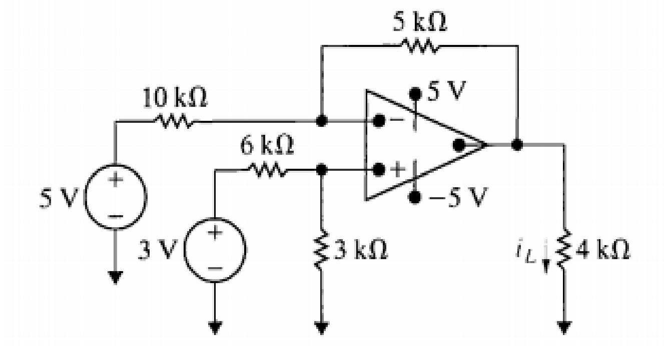

Fig.1

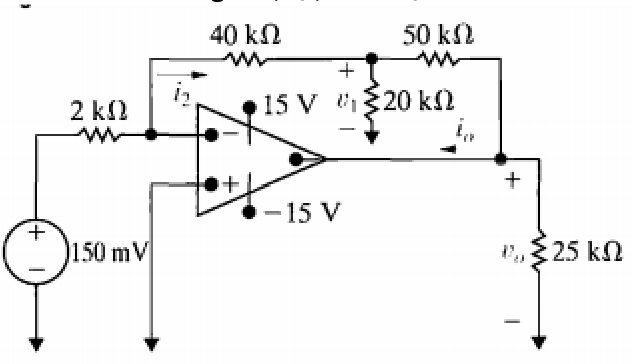

Fig.2

Q3: The op-amp in Fig.3 is ideal.

A) What circuit configuration is shown in this figure?

B) Find v_o if v_a=1V v_b=1.5v and v_c=-4v .

c) The voltages v_a and v_c remain at 1Vand - 4V, Respectively. What are the limits on v_b if the op-amp operates within its linear region?

Q4: The op-amp in Fig.4 is ideal.

A) Calculate v_o when v_g equals 4V.

b) Specify the range of values of v_g so that the op-amp operate in linear region.

c) Assume that v_g equals 2V and that the 63k Resistor replaced with variable what is its value to saturate the op-amp?

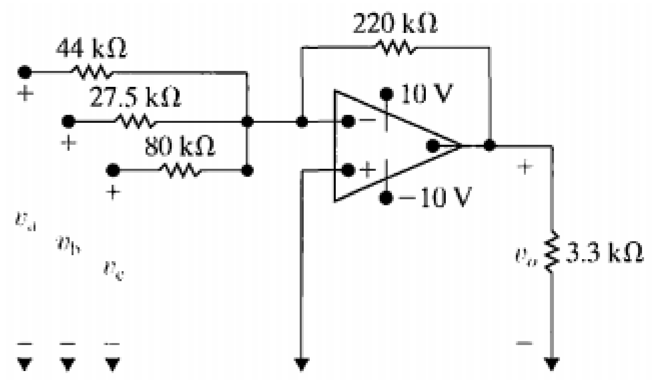

Fig.3

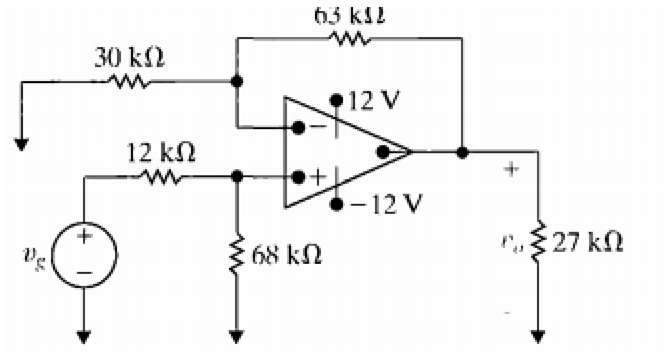

Fig.4

Q5: The circuit in Fig.5 is an non inverting summing amplifier. Assume the op-amp is ideal. Design the Circuit so that V_o= V_a+ $2V_b$ +$3V_c$ **a)** Specify the numerical values of R_a and R_c. **b)** Calculate i_a ,i_b,and i_c (in micro amperes) when v_a=0.7V, v_b=0.4V, and v_c=1. 1V.

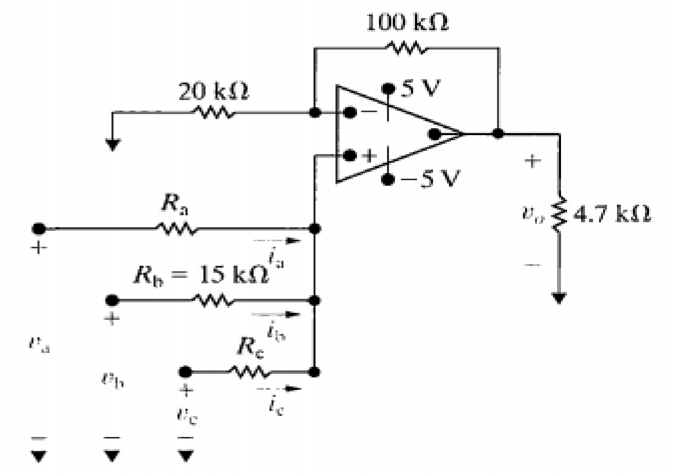

Fig.5

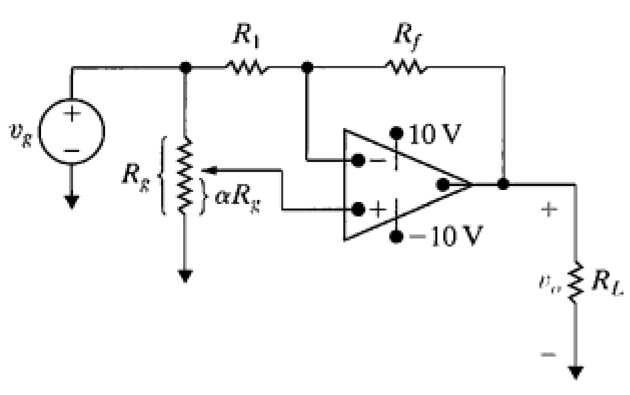

Fig.6

Q6: The op-amp in the circuit of Fig.6 is ideal.

a) Plot v_o versus α when R_f=4R_1 and v_g= 2V. Use increments of 0.1 and note by hypothesis that O<α<1.0.

b) Write an equation for the straight line you plotted in(a).How are the slope and intercept of the line related to v_g and the ratio R_f/R_i?

c) Using the results from(b), choose values for v_g and the ratio R_f/R_1 such that v_o=-6 α+4.

Q7 : The voltage v_g shown in Fig.7 (a) is applied to tne Inverting amplifier shown in Fig.7 (b). Sketch v_o versus t, assuming the op-amp is ideal.

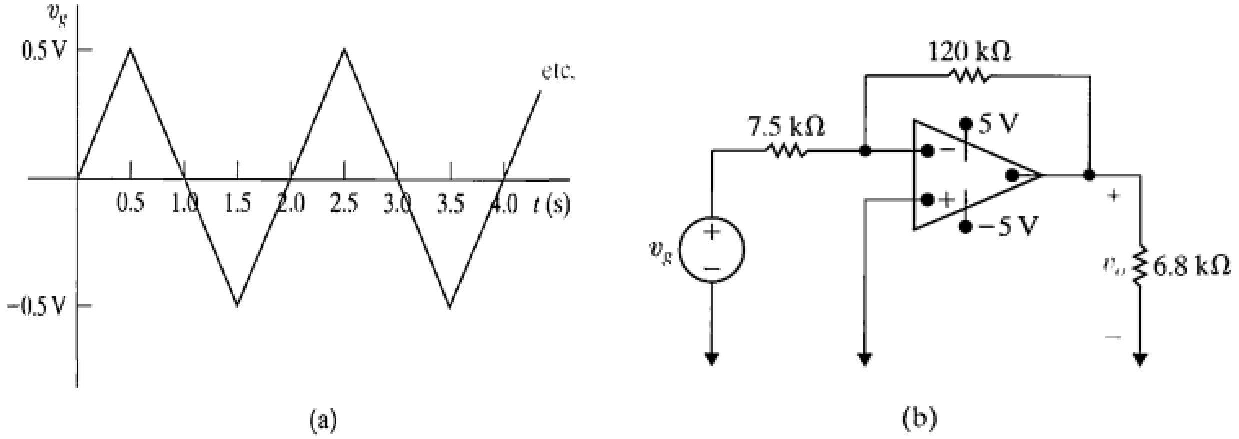

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Fig.7

Q8: The op-amps in the circuit in Fig.8 are ideal .

a) Find i_a .

b) Find the value of the left source voltage for which i_a=0.

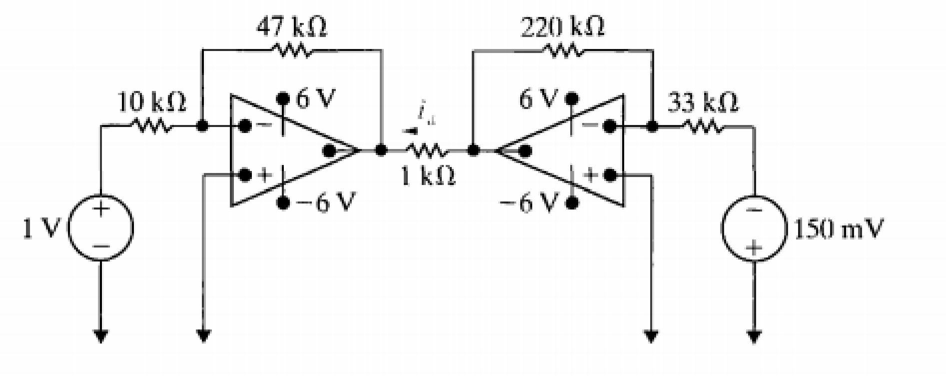

Fig.8

Q9: A four-bit R-2R ladder DAC is presented in Fig. 9

(a) Show that the output voltage is given by

$$-V_o = R_f\left(\frac{V_1}{2R} + \frac{V_2}{4R} + \frac{V_3}{8R} + \frac{V_4}{16R}\right)$$

(b) If R_f =12 kΩ and R=10 kΩ,
find |Vo| for [$V_1V_2V_3V_4$] =[1011] and [$V_1V_2V_3V_4$] =[0101].