1. Terminologies explanation: (15 points)

    (a) LED　(b) IC　(c) nanometer　(d) OPA　(e) MOS

2. As shown in Fig. 1, given a LED with the forward bias of 1.5V and the forward current range of 15-25 mA, if the DC 36V is added on the LED and calculate the reasonable range of the series resistance R.　(14 points)
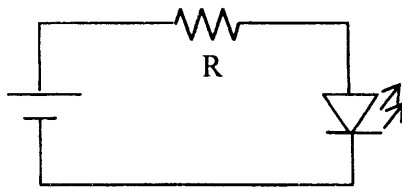

Fig. 1 A LED display

3. A clipper (截波器) is shown in Fig. 2, if the input Vi is a sine waveform of ±20V and the reference voltage of E is 4V, show the waveform of output voltage Vo.　(14 points)
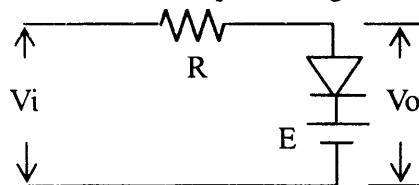

Fig. 2　A clipper

4. A clamper (箝位器) is shown in Fig. 3, if the input Vi is a sine waveform of ±20V and show the waveform of output voltage Vo.　(14 points)
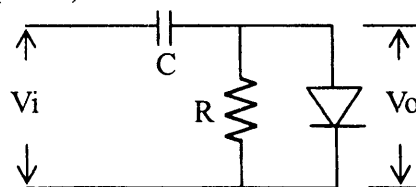

Fig. 3　A clamper

5. What the major differences are for CE, CC, and CB amplifiers in terms of Av, input impedance, and output impedance.　(14 points)

	Av (Voltage gain)	input impedance	output impedance
CE			
CC			
CB			

6. Show the equivalence of different numerical systems.　(16 points)

    $41.375_{(10)}$ = _____ (2) = _____ (8) = _____ (16) = _____ (BCD)

7. An OPA adder is shown in Fig. 4, if V_1 = 2V, V_2 = 1.5V, and V_3 = -0.5V, then find the output voltage Vo.　(13 points)

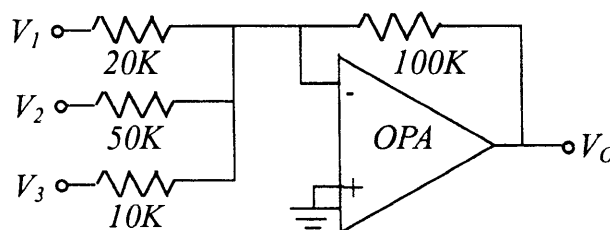Fig. 4　An OPA adder