




### **Sheet (1): Measurements Errors**

- 1) A batch of resistors that each have a nominal resistance of  $330\Omega$  are to be tested and classified as  $\pm 5\%$  and  $\pm 10\%$  components. Calculate the maximum and minimum absolute resistance for each case.
- 2) A group of resistors are specified to have a value of  $100\Omega \pm 8\%$  at  $25^\circ\text{C}$ . If the temperature coefficient of these resistors is  $-300 \text{ ppm}/^\circ\text{C}$ . Calculate the maximum and minimum resistance for these components at  $100^\circ\text{C}$ .
- 3) Determine the resolution of the digital instrument shown in the figure  

- 4) Three resistors are connected in series. One resistor has a value of  $330\Omega \pm 5\%$ , and the other two are  $330\Omega \pm 10\%$ . Calculate the maximum and minimum values of the total resistance.
- 5) A DC power supply provides currents to four electronic circuits. The currents are,  $37\text{mA}$ ,  $42\text{mA}$ ,  $13\text{mA}$ , and  $6.7\text{mA}$ . The first two are measured with an accuracy of  $\pm 3\%$ , and the other two are measured with  $\pm 1\%$  accuracy. Determine the maximum and minimum level of the total supply current.
- 6) The voltages at opposite ends of a  $470\Omega \pm 5\%$  resistor are measured as  $V_1 = 12\text{V}$  and  $V_2 = 5\text{V}$ . The measuring accuracies are  $\pm 0.5\text{V}$  for  $V_1$  and  $\pm 2\%$  for  $V_2$ . Calculate the level of current in the resistor, and specify its accuracy.
- 7) A  $470\Omega \pm 10\%$  resistor has a potential difference of  $12\text{V}$  across its terminals. If the voltage is measured with an accuracy of  $\pm 6\%$ , determine the power dissipation in the resistor, and specify the accuracy of the result.