## **EXPERIMENT 6** TRANSIENT BEHAVIOUR OF RLC CIRCUITS

## **EXPERIMENTAL WORK**

E1 Setup the circuit given in Figure 1.

Adjust R to each of the values given below,

- <sub>a)</sub> Overdamped case  $R=4R_c=2200$
- b) Critically damped case  $R=R_c=550$
- c) Underdamped case  $R=0.25R_c=125$

In each cases, plot  $v_R(t)$ ,  $v_c(t)$ ,  $v_L(t)$  and input v1 using oscilloscope and sketch them one under other using a graph paper. Observe the variation of each response carefully and try to understand the main differences between the overdamped, critically damped and underdamped cases.

**REMARK:** Set frequency of the square wave to a value so that any response could be easily measured  $(f=100 \text{ Hz}, V_m=5V)$ . Note the effect of changing signal frequency.



Figure 1 RLC circuit to be setup for E1



**E2** Setup the circuit shown in Figure 2, observe and sketch the state trajectories for each cases given in E1

## CONCLUSION

C1 What are the main differences between the responses observed for the three types of dampings in the series RLC circuit.

**C2** In E2, you observed different types of trajectories. What is your conclusion about these trajectories for overdamped, underdamped and critically damped cases.