COLLEGE OF ENGINEERING & TECHNOLOGY

Department: Elctronics and Communications

Lecturer : Dr.Saleh Eissa

Course : Analog Signal Processing

Course Code: EC434

Problem Set 1

P1. For the circuit shown in the fig.1 below, sketch the capacitor voltage Vc(t) as well as the voltages and currents through both resistors with time if the switch is first set to position 1 and then turned to position 2 after 10 μs.

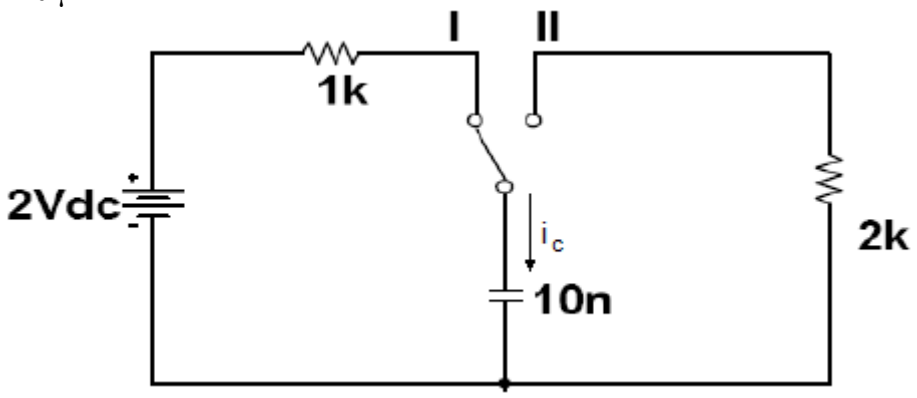

Fig.1

P2. For the RC circuit shown in the fig.2, if the switch is closed at t = 0, calculate:

a) The initial slope Vc(t)
b) The rise time
c) Total charge time
d) The time taken to reach 63.2% of the steady state value

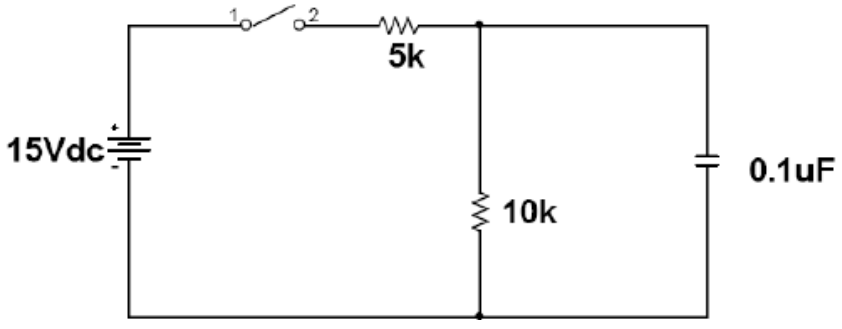

Fig.2

P3. The switch in the fig.3 is closed at t =0 and then reopened after 1 μs. Sketch $V_c(t)$ as well as the switch current i_{sw} during both intervals.

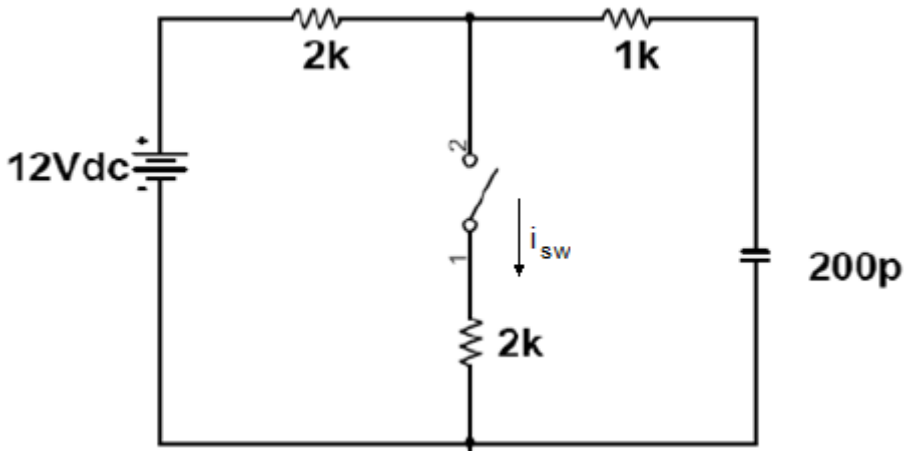

Fig.3

P4. Given that at t=0, switch 1 is closed and switch 2 is opened. At V_{out}=10V, switch 2 is closed. Calculate and sketch $V_{out}(t)$, $V_c(t)$ and $i_c(t)$ for the circuit in fig.4 .

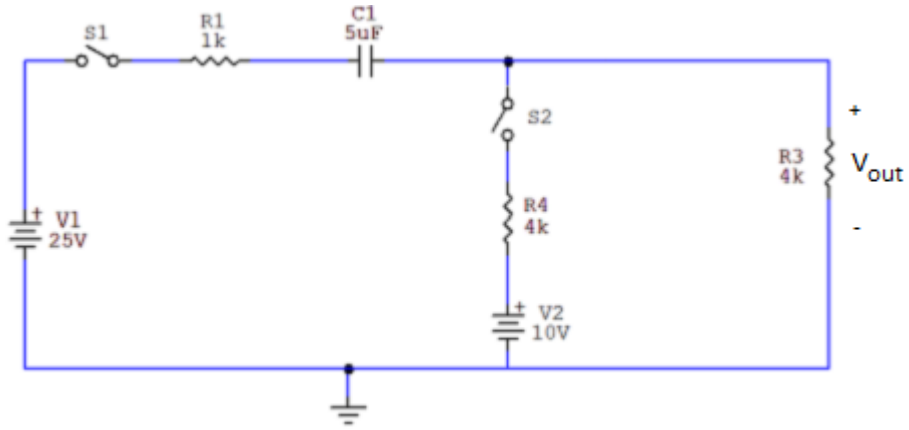

Fig.4

P5. Calculate and sketch the capacitor voltage in the circuit from t=0 to t=20ms when a square wave of f=125Hz and E=20V is applied at the input of the circuit in fig.5 if R=3.3kΩ and C=1μF.
Also, calculate the maximum and minimum levels at which the capacitor voltage will settle.

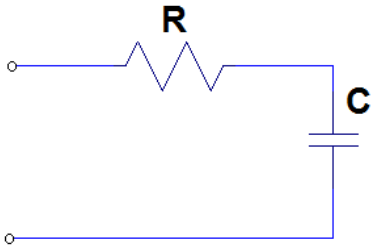

Fig.5

P6. For the circuit in fig.5, a square wave is applied at the input with E=10V. Calculate the maximum and minimum settled capacitor voltage if R=1KΩ and C= 1μF for:

a. f=500Hz
b. f=5KHz
c. f=50Hz

Deduce the condition for which the circuit will operate as an integrator.

P7. The circuit shown in fig.5 have the following pulse inputs applied:

a. E=10V, PW=1ms
b. E=10V, PW=2ms
c. E=20V,PW=1ms

If R=10KΩ and C=20μF, calculate the level of V_c at the end of each pulse. The initial charge on C is assumed to be zero. Show the V_c α PA x PW. (PA= Pulse Amplitude, PW=Pulse Width)

P8. For the circuit shown in fig.6, a pulse is applied at the input with E=10V, calculate and sketch $V_c(t)$ if R=1KΩ and C= 1μF for:

a. PW=1msec
b. PW=0.1msec
c. PW=10msec

Deduce the condition for which the circuit will operate as a differentiator.

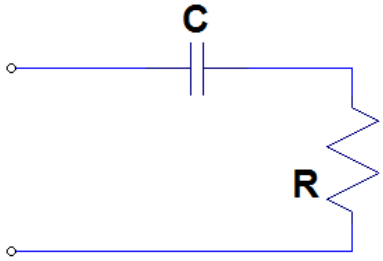

Fig.6