**EE 111 Electric Circuits Midterm**

**May 13 2020, 8:00 AM – 10:00 AM**

7 Problems (1 A4 crib sheet allowed)

Answer the Questions in English and on Answer Sheets only

Draw the circuits on Answer Sheets for all problems

Show your work (for partial credits)

1. **(10 points)** For the circuit shown in Fig.1, use mesh-current method to find *i*1.



Fig. 1

2. **(15 points)** For the circuit shown in Fig.2, absorbs the maximum power when . Find

a) the value of *R*;

b) the power generated by the voltage source when .



Fig. 2

3. **(15 points)** The operational amplifier in the circuit shown in Fig.3 is ideal and operates in linear range.

1. Write as a function of .
2. If , find .
3. What is the input resistance seen by voltages vc.



Fig. 3

4. **(15 points)** Find *vo* in the circuit below when *vs* = 30*u*(*t*)V. Assume that *vo*(0-) = 5 V.



Fig. 4

5. **(15 points)** The switch in Fig below has been closed for a long time before operating at *t* = 0. Find



Fig. 5

a) *i*L(*t*), t > 0.

b) *v*L(*t*), t > 0

c) *i*△(t), t > 0

6. **(15 points)** Consider the RLC circuit below, for t < 0, the switches were open for a long time.

At t = 0, both switches were closed, having 2 additional current sources added into the circuit. Find:

1. The initial value of *v*c(*t*)、*i*L(*t*) at t=0.
2. The expression for *v*c(t) when t > 0



Fig. 6

7. **(15 points)** For the circuit below, find *i*(t) and *v*(t) for *t* > 0. Assume the system reaches steady state before *t* = 0.

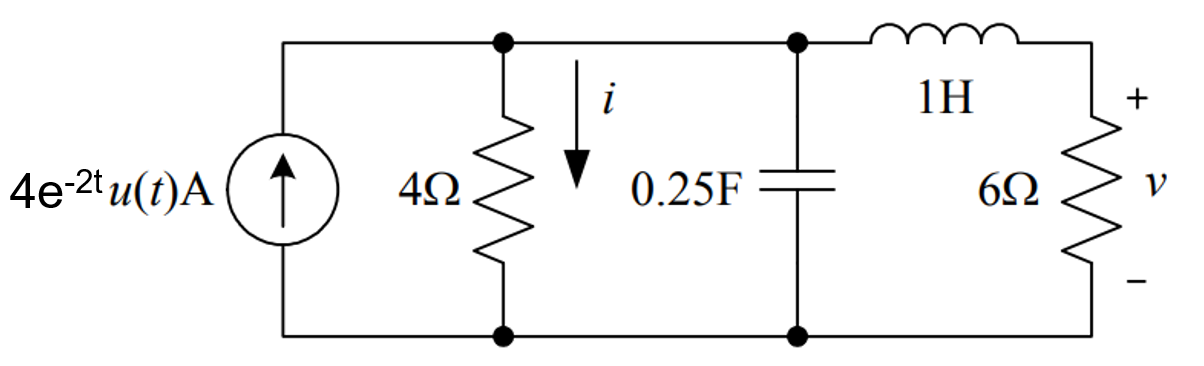


Fig. 7