

## Problem Set #1, EE part

Issue date: Sept. 26, 2021; Deadline: 23:59, Oct. 7, 2021

Student Name: \_\_\_\_\_ Student No.: \_\_\_\_\_

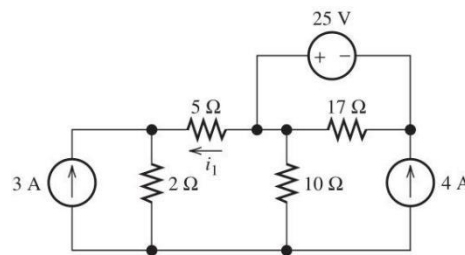
### 1. Electrical and electronic technology

As introduced during the first lecture, many milestone technologies enable electrification (电气化) and informatization (信息化) during the second and third industrial revolutions. In this problem, you are asked to search the Internet (google, bing, baidu, etc.), and find out the specific details of these two concepts.

- Can you specify the different features of electrification and informatization? (10')
- Besides the winners of the five Nobel Prize winner, tell us another one pioneering scientist or engineer who has made significant contributions towards electrification or informatization. (5')
- Point out one of his/her most representative discoveries or inventions. Briefly explain the working principle of such discovery or invention and its relation to electrical engineering (10')

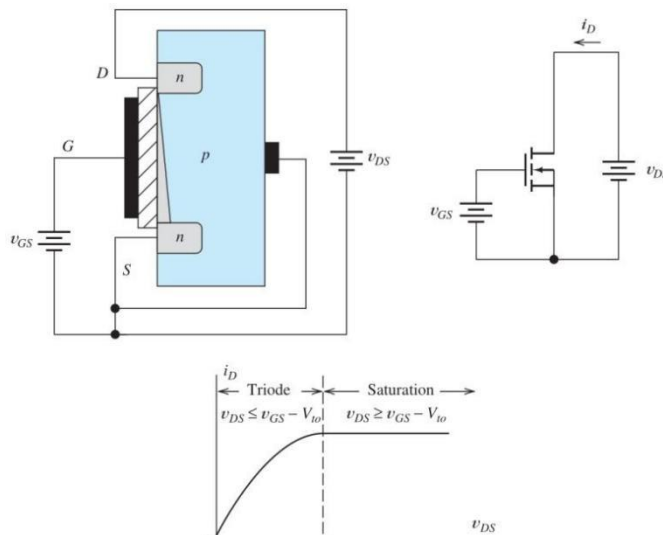
### 2. Linear resistive network

- Use Multisim simulation to study the I-V characteristics of a current source and a voltage source (hint: connect a resistor and change its value, mark down the current and voltage history). (5')
- Determine the value of  $i_1$  in the following circuit using
  - Multisim simulation tool (show the circuit schematic, simulation waveform). (15')
  - Superposition principle 叠加原理. Search the Internet for more information about superposition in circuit analysis. (5')



### 3. Transistor characteristics.

- Select an NMOS model in Multisim. Build a simple single-MOSFET circuit, as shown below. Generate the characteristic curves under different  $v_{GS}$  (as Figure 12.6 did in the EE textbook). (20')
- How to make it “on” or “off”? (5')



#### 4. MCU development

- Using the micropython official website to write a program in micropython to print out "Hello world" (one time is enough) and make the LED on the virtual board flash. The effect is to flash twice at an interval of 0.5 seconds, and then twice at an interval of 0.2 seconds. Follow this cycle. (25')

(The online micropython address: [www.micropython.org/unicorn](http://www.micropython.org/unicorn))

(Annotate each line of your code and take a clear picture. Make sure your student ID card is shown in the picture.)

*\* Please submit the softcopy of your solutions to the problems on gradescope.*

*\* All flow charts and codes should be enclosed in your solutions.*

*\* Discussion on methodology is allowed, yet, the assignment should be done individually. Plagiarism, once found, grades zero for the whole homework assignment!!*