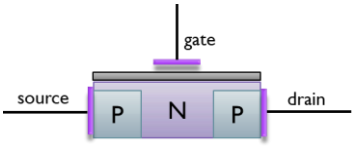
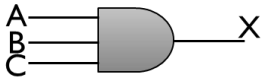
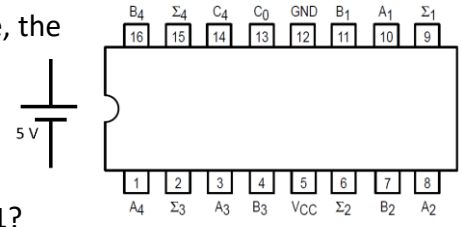
1. The idea of programing comes from a programmable machine invented in 1804. What is that machine used for? (5%)
2. Before the invention of the first generation computer, what is it used to process the on and off signal of electricity? (5%)
3. Your current generation of computer is based on the invention of the 4004 CPU. Which generation of computer are you using now? (5%)
4. The vacuum tube diode was invented in 1904. Can you tell us its size? Can you draw a current-voltage behavior to show the diode operation? (10%)
5. Could you simply explain how to operate the *n*-type field-effect transistor shown in the right figure? (10%)




6. Please write a true table for the logic gate shown in the right. (10%)




7. For a Motora 74LS83 shown in the right figure, the input pins are $A_1$-$A_4$ and $B_1$-$B_4$. If you have a 5 V voltage source, how do you connect the wire to the chip and demonstrate the addition of the binary operatio of 0110 + 0011? (10%)




8. Please convert the decimal number 7412 to (a) a binary number, (b) an octal number, and (c) a hexadecimal number. (10%)
9. What is an analog to digital converter? For example, how does it convert 3.0 V to a 8-bit digital signal if a full voltage range is between 0 and 5 V. (10%)
10. For a 8-bit, signed integer, please show the decimal numbers 20, -40, 110, -120 in the binary form. (10%)
11. Please use 8-bit signed binary numbers to show how computer calculate the decimal number operation of 7 x 9 = 63. (10%)
12. Please use 8-bit signed binary numbers to show how computer calculate the decimal number operation of 3 – 4 = -1. (10%)
13. If the ASCII decimal number of the character ‘A’ is 65. What is the ASCII decimal and hexadecimal numbers of the character ‘M’? (10%)
14. Please explain what it has done in the codes of a DOS batch file shown in the right. (10%)

```
cls
set /p inn=Please input a number (0-255):
set /a rmn=%inn%%%2
echo rmn = %rmn%
set /a inn=%inn%/2
if %inn% == 0 (echo We finish the calculation.)
```