

## KNOWLEDGE PROBE 4: METAL OXIDE SEMICONDUCTOR FIELD EFFECT TRANSISTORS (MOSFETS) AND COMMON ELECTRONIC CIRCUITS

### MOSFET Switches

#### Learning Objectives

1. Describe advantages and disadvantages to using MOSFETs.
  2. Describe basic MOSFET switching circuits with an emphasis on complementary MOS (CMOS).
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1. When a MOSFET is conducting as a switch, it has a
    - a. Low capacitance
    - b. Low resistance
    - c. Very high capacitance
    - d. Very high resistance
  2. A basic N-channel E-MOSFET inverter like that shown uses a 2.5 volt power supply. The threshold value is 0.8 volts. When the input is +2.5 volts, the drain voltage will be near
    - a. +2.5 volts
    - b. 1.7 volts
    - c. 0.8 volts
    - d. Zero volts
  3. What is the purpose of the diode connected across the relay coil in a MOSFET relay driver circuit?
    - a. To minimize static electricity damage
    - b. To speed up relay turn-off
    - c. To speed up relay turn-on
    - d. To suppress the inductive spike when the coil is de-energized
  4. What is the name of the motor reversing circuit using four MOSFETs?
    - a. Balanced bridge
    - b. Diamond bridge
    - c. H bridge
    - d. Wheatstone bridge
  5. In the motor reversing circuit using four MOSFETs, how many MOSFET are conducting at any given time?
    - a. 1
    - b. 2
    - c. 3
    - d. 4
  6. In a CMOS inverter circuit with a +3.3 volt power supply, what input voltage does it take to make the P-channel device to conduct?
    - a. -3.3 volts
    - b. 0 volts
    - c. +1.6 volts
    - d. +3.3 volts

7. Is there ever a time when both N and P-channel devices conduct at the same time in a CMOS inverter?
  - a. No
  - b. Yes
8. In a BiCMOS inverter, which type of transistor is used at the output?
  - a. CMOS
  - b. BJT
9. What is the reason that BJTs are combined with CMOS in a BiCMOS circuit?
  - a. Output can drive larger current loads
  - b. They are faster
  - c. They take up less space on the chip
  - d. They use less power
10. In a transmission gate, the MOSFETs are connected how with respect to the load?
  - a. In parallel
  - b. In series
11. A transmission gate can switch digital as well as analog signals.
  - a. True
  - b. False
12. A transmission gate is NOT bidirectional.
  - a. True
  - b. False
13. In an S/H circuit, what component is used to store the input voltage value?
  - a. Transmission gate
  - b. Resistor
  - c. Op amp
  - d. Capacitor
14. In an S/H circuit, the input voltage is stored when the transmission gate is
  - a. Open
  - b. Closed
15. In a multiplexer circuit using 8 transmission gates, how many gates are closed at the same time?
  - a. 1
  - b. 2
  - c. 4
  - d. 7