

## KNOWLEDGE PROBE 3: METAL OXIDE SEMICONDUCTOR FIELD EFFECT TRANSISTORS (MOSFETS) AND COMMON ELECTRONIC CIRCUITS

### Linear MOSFET Circuit Operation

#### Learning Objectives

1. Explain basic MOSFET linear circuits including current sources and differential amplifiers
  2. Describe basic MOSFET switching circuits with an emphasis on complementary MOS (CMOS)
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1. What connection is used in most MOSFET amplifiers?
    - a. Common drain
    - b. Common gate
    - c. Common source
    - d. None of the above
  2. It is not possible to bias MOSFETs for linear operation without resistors.
    - a. True
    - b. False
  3. The load in the drain connection in a common source MOSFET amplifier is usually a
    - a. BJT
    - b. Capacitor
    - c. MOSFET
    - d. Resistor
  4. Both P and N-type MOSFETs may be used in lieu of a resistor in most common source MOSFET amplifiers.
    - a. True
    - b. False
  5. Connecting the gate to the drain in a MOSFET causes it to act like a(n)
    - a. BJT
    - b. Capacitor
    - c. Opposite polarity MOSFET
    - d. Resistor
  6. Voltage dividers may be formed with MOSFETs alone and no resistors.
    - a. True
    - b. False
  7. A MOSFET current source supplies a constant
    - a. Current
    - b. Impedance
    - c. Load
    - d. Voltage



8. A MOSFET current sink supplies a constant
  - a. Current
  - b. Impedance
  - c. Load
  - d. Voltage
9. What is the primary purpose of current mirrors in a linear MOSFET circuit?
  - a. Biasing
  - b. Frequency compensation
  - c. Providing a constant load
  - d. Supplying DC voltage
10. Besides the common source amplifier, what other amplifier configuration is widely used in linear circuits?
  - a. Common gate amplifier
  - b. Current sink
  - c. Differential amplifier
  - d. Source follower
11. The benefits of a cascade amplifier are
  - a. Higher gain
  - b. Higher input impedance
  - c. Wider frequency response
  - d. A and b
  - e. B and c
12. Which of the following is the negative effect of Miller capacitance?
  - a. Inter-electrode capacitance that limits the upper frequency response
  - b. Limits rise and fall times of input and output signals
  - c. Makes output impedance too high
  - d. Restricts the amount of voltage that can be applied to the input
13. A source follower is a
  - a. Current amplifier
  - b. Current sink
  - c. Power amplifier
  - d. Voltage amplifier
14. The key characteristic of a complementary symmetry power amplifier is that it uses
  - a. Both a BJT and a MOSFET
  - b. Both an N-channel and a P-channel MOSFET
  - c. Two N-channel MOSFETs
  - d. Two P-channel MOSFETs



15. Complementary symmetry MOSFET power amplifiers operate
  - a. Class A
  - b. Class AB
  - c. Class B
  - d. Class C
  
16. Which of the following occurs if a complementary symmetry power amplifier is not properly biased to allow a small drain current to flow?
  - a. Cross over distortion
  - b. Excessive current drain
  - c. Reduced power output
  - d. Restricted frequency response
  
17. Which of the following components usually appears in a MOSFET op amp?
  - a. BJT
  - b. Capacitor
  - c. Inductor
  - d. Resistor
  
18. The power to a MOSFET op amp is usually provided by
  - a. A single positive DC supply
  - b. Dual negative supplies
  - c. Dual positive supplies
  - d. One positive and one negative supply