

SRI SAIRAM ENGINEERING COLLEGE
DEPARTMENT OF ELECTRONICS AND COMMUNICATION
ENGINEERING

SAMPLE QUESTIONS FOR TEACHING LEARNING PROCESS

Domain: **ELECTRONIC DEVICES AND CIRCUITS**

1) The value of transconductance decreases in simplified low frequency equivalent circuit of n-channel MOSFET due to increase in the value of _____

- a. Source resistance
- b. Load resistance
- c. Both a and b
- d. None of the above

2) What is the effect of MOSFET biasing in the saturation region especially while representing the internal resistances and capacitances in n-channel E-MOSFET configuration?

- a. Channel gets pinched off at the drain by increasing the value of C_{gd}
- b. Channel gets pinched off at the source by increasing the value of C_{gd}
- c. Channel gets pinched off at the drain by decreasing the value of C_{gd} upto zero
- d. Channel gets pinched off at the source by decreasing the value of C_{gd}

3) Which among the following are specifically the advantages of bipolar design technology?

- A. High input resistance at low frequencies
- B. Zero input bias current
- C. High voltage gain
- D. High value of transconductance

- a. A & B
- b. A & C
- c. B & D
- d. C & D

4) Which condition is applicable for a body to be more positive than source in a small signal equivalent circuit of N-type MOSFET inclusive of body effect?

- a. $V_{bs} > 0$
- b. $V_{bs} < 0$
- c. $V_{bs} = 0$
- d. None of the above

5) Which among the below mentioned devices acts as a driver in CMOS Inverter Circuit?

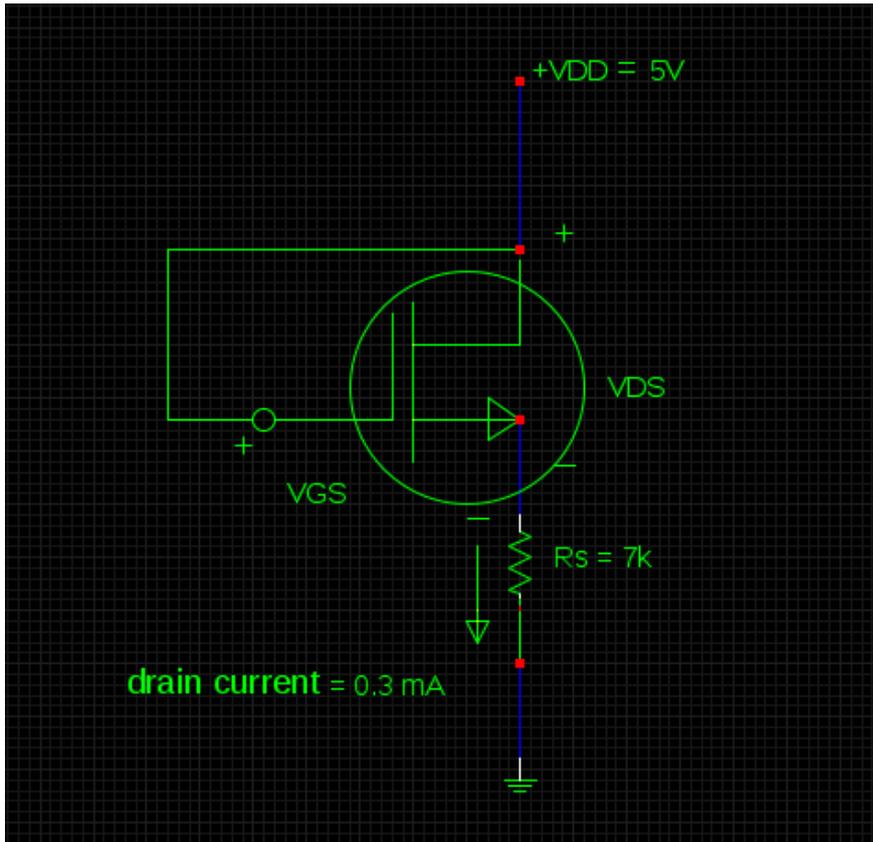
- a. PMOS
- b. NMOS
- c. Both a and b
- d. None of the above

6) Biasing of D-MOSFET in saturation or non-saturation region while using with depletion load device, specifically depends on _____

- a. V_{DD} & R_s
- b. V_{DD} & V_{DS}
- c. V_{DD} & I_D
- d. I_D & R_s

7) What is the value of gate-to-source voltage (V_{GS}) for the circuit diagram shown below?

NMOS Enhancement Circuit with ' R_s '



- 1.5 V
- 2.9 V
- 3.5 V
- 4.9 V

8) Which resistance plays a significant role in stabilization of Q-point for self-biasing circuit of BJT?

- Emitter resistance
- Collector resistance
- Source resistance
- Drain resistance

9) What is the significance of adopting an interdigitated structure of power transistors?

- Prevention of current crowding
- Maintenance of reasonable current densities
- Both a and b

d. None of the above

10) Which among the below mentioned reasons is/are responsible for the occurrence of second breakdown phenomenon in power BJT?

- a. Large current
- b. Distribution of current in a non-uniform manner
- c. Excessive power dissipation
- d. All of the above

11) Which types of power transistors have the capability to withstand the higher junction temperatures?

- a. Silicon power transistors
- b. Germanium power transistors
- c. Both a and b
- d. None of the above

12) Which among the below stated parameters gets affected due to drift region in the power transistor?

- a. Breakdown voltage
- b. On-state losses
- c. Switching time
- d. All of the above

13) Which among the following oscillators are specifically preferred at high frequencies?

- a. LC oscillators
- b. RC oscillator
- c. Both a and b
- d. None of the above

14) Which among the following measures is/are adopted/used for improving the frequency stability in Colpitt's oscillator?

- a. Clapp oscillator

- b. Temperature stabilized chamber
- c. Voltage regulators
- d. All of the above

15) According to the property of tuned circuit used in LC oscillators, the decay rate is proportional to _____

- a. Shape & size of current pulse
- b. Time constant
- c. Both a and b
- d. None of the above

16) What are the consequences over the non-linear distortion by the inception of negative feedback?

- a. Level of non-linear distortion goes on increasing
- b. Level of non-linear distortion goes on decreasing
- c. Level of non-linear distortion undergoes stability
- d. None of the above

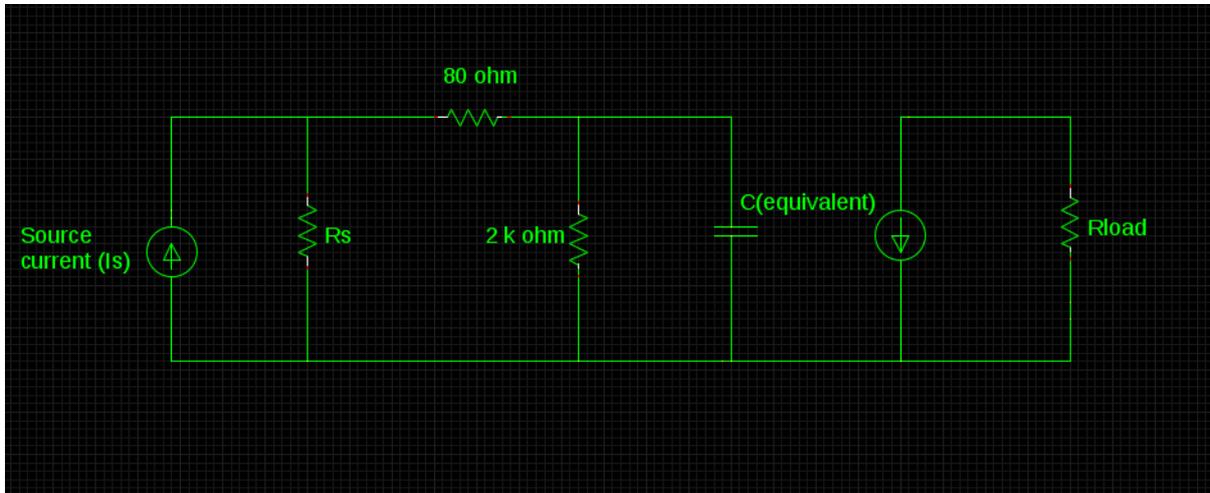
17) Stability of a transfer gain is generally defined as the reciprocal of _____

- a. Resistivity
- b. Conductivity
- c. Sensitivity
- d. Desensitivity

18) What would happen, if the signal X_d passes through the feedback network?

- a. X_d will get multiplied by 'A'
- b. X_d will get multiplied by ' β '
- c. X_d will get multiplied by ' $1 - A\beta$ '
- d. X_d will get multiplied by ' $1 + A\beta$ '

19) Consider a single stage CE amplifier is estimated to possess the bandwidth of about 2MHz in addition to the resistive load of 500 ohm. What should be the value of source resistance in order to get the required bandwidth for the hybrid π equivalent circuit in accordance to the transistor assumptions given below?



$h_{fe} = 100$, $g_m = 30 \text{ mA}$, $r'_{bb} = 80\Omega$, $C_c = 3\text{pF}$, $f_T = 200\text{MHz}$, $C_e = 20\text{pF}$, $f_H = 5\text{MHz}$, $r'_{be} = 2\text{k}\Omega$

- 497.4 Ω
- 531.15 Ω
- 731.04 Ω
- 900 Ω

20) What should be the value of unity gain frequency for a short circuit CE transistor with gain of 30 at 4MHz and cut-off frequency of about 100 kHz?

- 40 MHz
- 80 MHz
- 120 MHz
- 150 MHz

21) Miller's theorem is applicable in a single stage CE hybrid π model in order to deal with _____

- Series combination of C_c and r'_{bc}
- Series combination of C_e and r'_{be}
- Parallel combination of C_c and r'_{bc}
- Parallel combination of C_e and r'_{be}

22) Which capacitors assists in preventing the loss of gain due to negative feedback without affecting the DC stability of R-C Coupled amplifier?

- a. Coupling capacitors (C_c)
- b. Bypass capacitors (C_E)
- c. Both a and b
- d. None of the above

23) Which among the following is not an advantage of RC coupled amplifiers?

- a. High fidelity
- b. No core distortion
- c. No impedance matching
- d. Wide frequency response

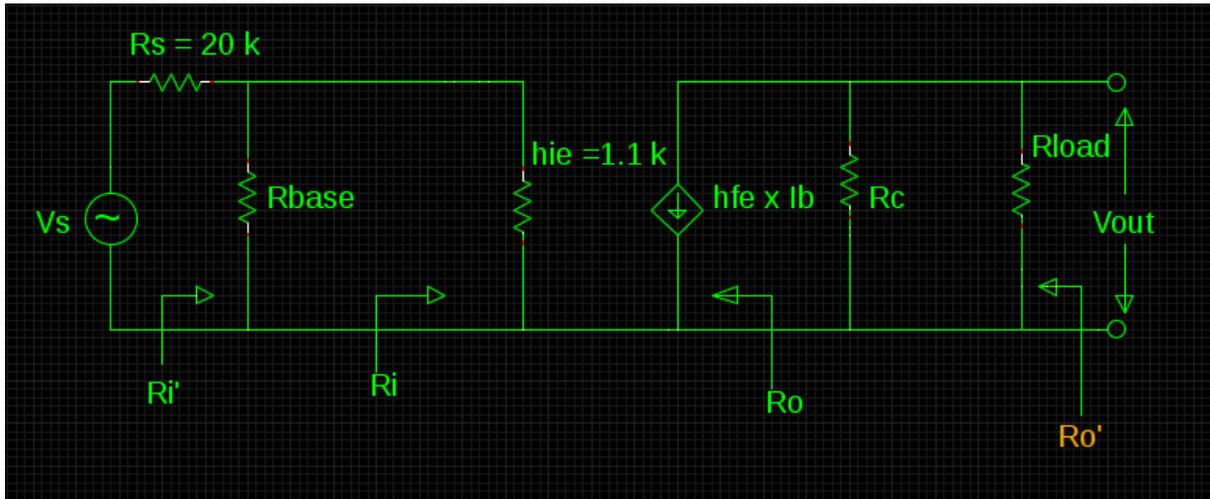
24) Which among the below mentioned circuits resemble its behaviour similar to that of an amplifier in high frequency region, as the response decreases with an increase in frequency?

- a. Simple high pass circuit
- b. Simple low pass circuit
- c. Simple band pass circuit
- d. Simple band stop circuit

25) Why is the Darlington configuration not suitable for more than two transistors?

- a. Because leakage current increases and voltage gain decreases with multiple number of transistors
- b. Because leakage current decreases and voltage gain increases with multiple number of transistors
- c. Because leakage current as well as voltage gain increases with multiple number of transistors
- d. Because leakage current as well as voltage gain decreases with multiple number of transistors

26) What should be the value of resistance between collector and ground (R_0) for below drawn schematic of transistor amplifier, comprising h-parameters as $h_{ie} = 1.1 \text{ k}\Omega$, $h_{fe} = 50$, $h_{re} = h_{oe} = 0$ with short-circuit capacitors?



- a. 5.2 k
- b. 2.3 k
- c. 1.1 k
- d. Infinity

27) Consider the assertions given below.

- A. Replacement of each coupling and bypass capacitors by a short circuit
- B. Replacement of transistor by its hybrid equivalent model for further analysis
- C. Replacement of DC voltage sources by a short circuit

Which is the correct sequential order of steps to be carried out for analysis of a transistor amplifier circuit?

- a. A, B, C
- b. B, A, C
- c. A, C, B
- d. C, A, B

28) Which among the below stated notations of h-parameters is used to represent the short-circuit forward current transfer ratio?

- a. h_{11}
- b. h_{12}
- c. h_{21}
- d. h_{22}

29) Which among the below specified conditions is applicable to prevent the occurrence of thermal runaway in voltage divider bias circuit?

- a. $V_{CE} < V_{CC} / 2$
- b. $V_{CE} = V_{CC} / 2$
- c. $V_{CE} > V_{CC} / 2$
- d. None of the above

30) On which factor/s do/does the value of thermal resistance depend?

- a. Size of transistor
- b. Type of cooling system
- c. Type of heat transfer mechanism
- d. All of the above

Answer Explanation Related Ques

ANSWER: All of the above

31) Which techniques is/are adopted for reducing the drift in the operating point especially when the loss of signal is intolerable?

- a. Bias stabilization
- b. Bias compensation
- c. Both a and b
- d. None of the above

32) Which process plays a crucial role in devising the independency of operating point over the variations in temperature or transistor parameters?

- a. Bias stabilization
- b. Bias compensation
- c. Both a and b
- d. None of the above

33) Which type of temperature dependent resistor exhibits a positive temperature coefficient of resistivity?

- a. Thermistor

- b. Sensistor
- c. Both a and b
- d. None of the above

34) Which among the below mentioned implementation strategies is/are precise to obtain an AC equivalent circuit of MOSFET?

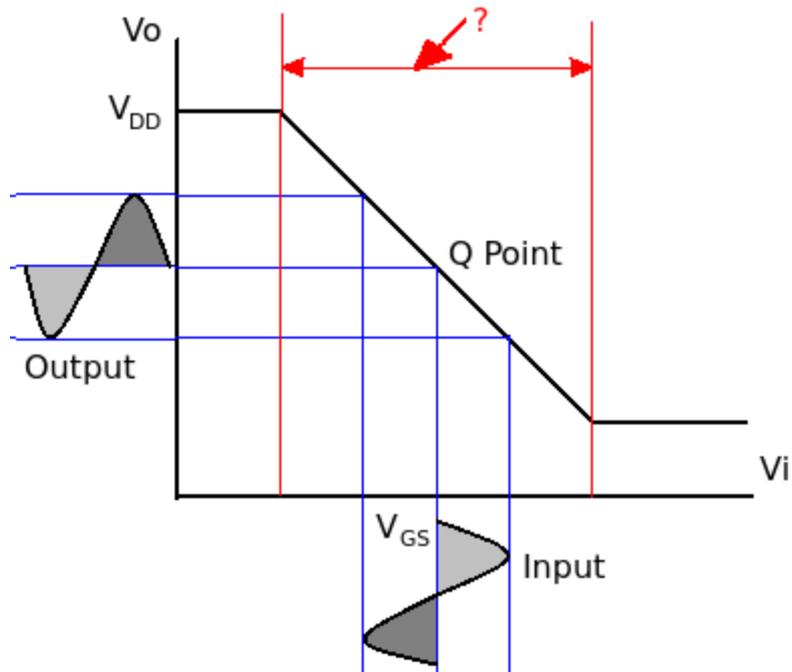
- A. Replacement of all capacitors by open circuits
- B. Replacement of all capacitors by short circuits
- C. Setting of all DC voltages to zero
- D. Setting of all DC voltages to unity

- a. A & C
- b. B & C
- c. B & D
- d. A & D

35) What should be the value of transconductance, if N-channel E-MOSFET is biased in saturation region with the conduction parameter $(k) = 0.836 \text{ mA/V}^2$ and drain current $(I_D) = 1.5 \text{ mA}$?

- a. 1 mA/V
- b. 1.5 mA/V
- c. 2.23 mA/V
- d. 4.23 mA/V

36) What does an arrow indicate in the below drawn graph of small signal operation executed by MOSFET?



- Active Region
- Cut-off Region
- Saturation Region
- Breakdown Region

37) Under which category/region of the below specified regions does EMOSFET operate for switching-based applications?

- Saturation & Cut-off
- Active & Ohmic
- Only Saturation
- Ohmic & Cut-off

38) Which among the below stated transistors operate in an active region for the purpose of amplification?

- BJT
- E-MOSFET
- Both a and b
- None of the above

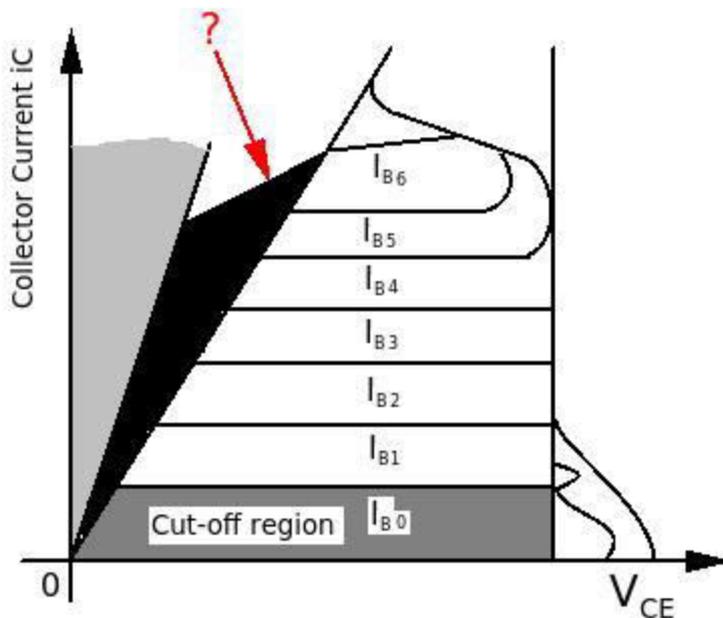
39) Which type of breakdown effect gets enhanced due to parasitic BJT action along with increase in drain current solely by the reduction in size of MOSFET?

- Near-avalanche breakdown
- Snapback breakdown
- Both a and b
- None of the above

40) The breakdown voltage V_{CEV} or V_{CEX} in power transistor is the maximum voltage between collector and emitter with _____

- Open circuited collector
- Open circuited base
- Base to emitter voltage that is adjusted to a specific negative value
- Base to emitter voltage that is adjusted to a specific positive value

41) What does an arrow indicate in the below drawn schematic of V-I characteristics of n-p-n power transistor?



- Primary breakdown
- Second breakdown
- Quasi saturation
- Active region

- 42) On which factor does the current gain (β) of power transistor depend?
- a. Thickness of emitter
 - b. Thickness of base
 - c. Thickness of collector
 - d. All of the above
- 43) Which among the following components is /are not involved in the feedback network configuration of LC oscillators?
- a. Inductor
 - b. Capacitor
 - c. Resistor
 - d. All of the above
- 44) Which is the necessary condition of gain while designing RC phase shift oscillator in order to ensure the sustained oscillations?
- a. $A \geq 29$
 - b. $A \leq 29$
 - c. $A \neq 29$
 - d. None of the above
- 45) What is an angle of phase shift for each designed RC network in the Phase Shift Oscillator circuit?
- a. 30°
 - b. 60°
 - c. 90°
 - d. 180°
- 46) Which among the below mentioned oscillators does not adopt any kind of feedback mechanism?
- a. Phase-shift oscillator
 - b. Wein bridge oscillator
 - c. UJT relaxation oscillator

d. All of the above

47) After passing through which circuit/network does the signal X_d (output signal obtained by taking the difference of two input signals) get multiplied by '-1'?

- a. Amplifier circuit
- b. Feedback network
- c. Mixing network
- d. Sampling network

48) What would be the computational value of feedback voltage in a negative feedback amplifier with $A = 100$, $\beta = 0.03$ and input signal voltage = 30 mV?

- a. 0.03 V
- b. 0.06 V
- c. 0.09 V
- d. 0.15 V

49) Which among the following is an output provided by transresistance amplifier?

- a. Output current proportional to signal voltage
- b. Output voltage proportional to signal current
- c. Output voltage proportional to input voltage
- d. Output current proportional to signal current

50) Which among the following will possess a higher bandwidth, if two transistors are provided with unity gain frequency?

- a. Transistor with lower h_{fe}
- b. Transistor with higher h_{fe}
- c. Transistor with lower h_{re}
- d. Transistor with higher h_{re}