



# AKSHEYAA COLLEGE OF ENGINEERING

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(An ISO 9001:2008 Certified Institution)



## Department of Electronics and Communication Engineering

### Question Bank- III Semester (2015-2016)

#### UNIT WISE EXPECTED UNIVERSITY EXAMINATION QUESTIONS

### EC 6304 - Electronic Circuits-I (Regulation 2013)

Handled By,

Ms.V.Revathi, A.P

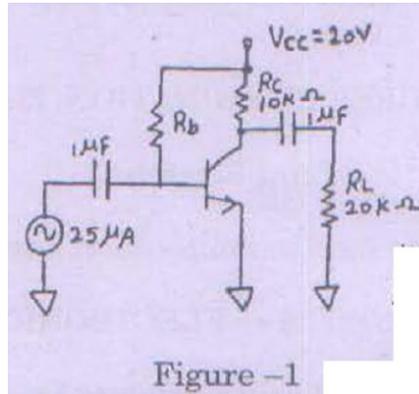
#### UNIT I - BIASING OF DISCRETE BJT AND MOSFET

##### PART A

1. **What is Biasing? And need for biasing.**[NOV/DEC-08,11],[MAY/JUN-09,13]
2. What is d.c load line? [NOV/DEC-06][MAY/JUN-12]
3. Name the two techniques used in the stability of the q point. Explain. [MAY/JUN-09,12]
4. **Define stability factor?**[MAY/JUNE-09,10][ NOV/DEC-09,12]
5. What are the methods for biasing? [NOV/DEC-09,12] [MAY/JUNE-09,10]
6. **Why is the operating point selected at the centre of the active region?** [NOV/DEC-11]
7. What do you mean by thermal runaway?[NOV/DEC-06]
8. How FET is known as voltage variable resistor?[DEC-06]
9. **Define ripple factor.** [MAY/JUN-13] [NOV/DEC-13]
10. Calculate the value of feedback resistor required to self bias an N channel JFET with  $I_{DSS} = 40\text{mA}$ ,  $V_P = -10\text{V}$  and  $V_{GSQ} = -5\text{V}$ . [MAY/JUN-10]
11. **Compare half wave and full wave amplifier.** [MAY/JUN-10] [NOV/DEC-12]
12. Define three stability factors. [NOV/DEC-12]
13. Mention the applications of class C amplifiers.[APR/MAY-11]
14. Draw the circuit diagram of transformer coupled class A amplifier.[NOV/DEC-06]
15. Why class A amplifier must not be operated under no signal conditions. [DEC-05]
16. What are the advantages and disadvantages of class B amplifier?[DEC-04]
17. List the condition periods of class A, class B and class C amplifiers. [ APR/MAY-11]

**PART B**

1. Derive the stability factor for voltage divider bias. (8) [MAY/JUN-13] [NOV/DEC-13] [NOV/DEC-14]
2. For the Circuit in the Figure-1 , draw the AC load line and determine the maximum output swing without distortion. (8) [MAY/JUN-13]



3. Discuss the various stabilization technique of Q-point in a transistor.(8) [MAY/JUN-13] [Nov/Dec - 12]
4. Discuss in detail about the various bias compensation techniques. (8) [MAY/JUN-13] [Nov/Dec - 12]
5. Briefly describe about any two bias compensation techniques of BJT. (6) [MAY/JUN-14]
6. With neat circuit diagram and needed expression explain the working principle of self bias of transistor. (10) [MAY/JUN-14]
7. What is stability? What is the need for load line and Q point calculation? [MAY/JUN-14]
8. Describe the basic concept involved with class B and class B push pull amplifier. (16) [MAY/JUN-14] [Nov/Dec - 12] [NOV/DEC-13]
9. Explain the basic operation of full wave rectifier and bridge rectifier. Derive the expression for ripple factor, efficiency, transformer utilization factor for full wave rectifier. (16) [MAY/JUN-14]
10. Explain in detail about the transformer – coupled class-A audio power amplifier and analyse its efficiency. (16) [MAY/JUN-13] [Nov/Dec - 12] [NOV/DEC-13] [NOV/DEC-14]
11. Explain the working of FWR with  $\pi$  filter. Derive its ripple factor.(8) [MAY/JUN-13] [NOV/DEC-13]
12. What is the need for biasing? Design a voltage divider bias circuit for the specified conditions.  $V_{CC} = 12V$ ,  $V_{CE} = 6V$ ,  $I_C = 1mA$ ,  $S=20$  ,  $\beta=100$  &  $V_E = 1V$ . Determine the values of  $R_1$ ,  $R_2$ ,  $R_E$  &  $R_C$ . (16) [Nov/Dec - 12]
13. Explain the circuit of gate bias for providing stabilization of FET. (8) [NOV/DEC-13]
14. Explain the operation of a complementary symmetry class B amplifier and explain its advantages. (8) [NOV/DEC-13] [NOV/DEC-14]

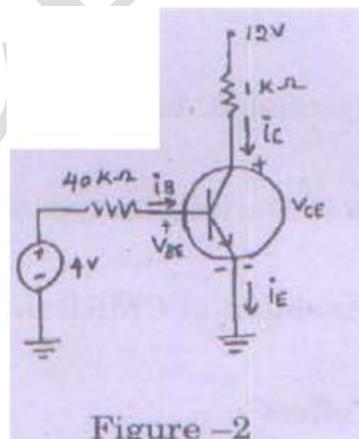
**UNIT II - BJT AMPLIFIERS****PART A**

1. What are the advantages of Darlington circuit [NOV/DEC-11] [NOV/DEC-13]

2. Define miller's theorem [APR/MAY-10][ APR/MAY-11] [MAY/JUN-13]
3. Define CMRR [NOV/DEC-09,11] and State the various methods of improving CMRR.[DEC-2007]
4. Define transconductance[NOV/DEC-09,11]
5. Draw a CE amplifier and its hybrid equivalent circuit.[MAY-08]
6. What is meant by bootstrapping?[Dec-2003] [ APR/MAY-11]
7. What is the need of differential amplifier?[Nov/Dec-2009] [ APR/MAY-11]
8. Why  $R_E$  is replaced by a constant current bias in a differential amplifier?[DEC-08]
9. Why emitter bypass capacitor  $C_E$  is used in CE amplifier circuit?[APR/MAY-04]
10. Draw the circuit diagram of darlington type amplifier. [MAY/JUN-13]
11. Give the reason for the improvement of CMRR in the amplifier. [MAY/JUN-13] [NOV/DEC-14]
12. Draw the small signal equivalent circuit of CE amplifiers. [NOV/DEC-12]
13. Two identical amplifiers are cascaded (having 10 dB gains each). Calculate the output voltage if the input of 1mV (p-p). [ APR/MAY-11]
14. Draw Darlington amplifier with Bootstrap arrangement. [NOV/DEC-10]
15. Why common base amplifier is preferred for high frequency signal when compared to common emitter amplifier? [NOV/DEC-10]
16. Mention the 2 important characteristics of CC circuit. [NOV/DEC-13]
17. Define conversion efficiency. [NOV/DEC-13]

## PART B

1. Describe with neat circuit diagram, the operation of common drain amplifier with small signal equivalent circuit. Derive the equation for voltage gain, input impedance and output admittance. (10) [MAY/JUN-14]
2. What is a differential amplifier? (6) [MAY/JUN-14]
3. Compute the parameters of the circuit shown in Figure – 2 with  $\beta = 100$ . (10) [MAY/JUN-13]



4. Explain in detail about the Miller's theorem. (6) [MAY/JUN-13]
5. Compare CE , CB and CC transistor configurations. [MAY/JUN-13]
  - (i) In terms of input impedance, output impedance, current gain and voltage gain. (10)
  - (ii) Draw the output Characteristics of CE configuration and mark its region of operation. (6)

6. Draw the circuit of a CE amplifier with coupling and bypass capacitors. With the help of its equivalent circuit, obtain the equation of the voltage gain, input and output impedance. (16) [NOV/DEC-13] [NOV/DEC-14]

7. Draw the circuit of emitter coupled differential amplifier and explain the operation of the circuit. Explain how the differential amplifier with a constant current stage improves the CMRR. (16) [NOV/DEC-13] [NOV/DEC-14]

8. Draw the equivalent circuit of darlington pair & determine the input impedance. Show that the input impedance of darlington pair is more than the CC amplifier. [NOV/DEC-14]

### UNIT III - JFET AND MOSFET AMPLIFIERS

#### **PART A**

1. How do you calculate the bandwidth of a signal? [MAY/JUN-13]
2. **Define bandwidth of an amplifier.** [NOV/DEC-13]
3. **Define beta cut off frequency.** [NOV/DEC-14]
4. Draw the small signal analysis of JFET common source amplifier.
5. What is the voltage gain of source follower circuit?
6. What is the advantage of BiCMOS technology?
7. Define BiCMOS technology.
8. Define transconductance with respect to a FET.
9. Why is FET preferred as a buffer amplifier?
10. Draw the AC loadline of JFET amplifiers.
11. **Why common drain is called as source follower?**
12. Why the input impedance of FET is more than that of BJT?
13. What is meant by gate source threshold voltage of a FET?

#### **PART B**

1. Describe the operation and analyze the basic JFET amplifier circuits.
2. **Derive the small signal analysis of common source amplifier.**
3. Develop a small signal model of JFET device and analyze basic JFET amplifiers.
4. Explain graphically the amplification process in a simple MOSFET amplifier circuit.
5. Describe the small signal equivalent circuit of the MOSFET and determine the values of small signal parameters?
6. Sketch the small signal high frequency circuit of a common source amplifier & derive the expression for a voltage gain, input & output admittance and input capacitance.
7. **Sketch a simple source-follower amplifier circuit and discuss the general ac circuit characteristics.**
8. Characterize the voltage gain and output resistance of a common-gate amplifier.
9. Apply the MOSFET small signal equivalent circuit in the analysis of multistage amplifier circuits.
10. **Explain common source amplifier with source resistor and source bypass capacitor.**
11. Write short notes Voltage swing limitations, general conditions under which a source follower amplifier would be used.

**12. Describe the characteristics of and analyze BiCMOS circuits.**

## **UNIT IV - FREQUENCY ANALYSIS OF BJT AND MOSFET AMPLIFIERS**

### **PART A**

- 1. Draw the high frequency equivalent circuit of FET. [NOV/DEC-12]**
2. Define the frequency response of an amplifier.
3. What is cascade amplifier?
- 4. Write the overall higher cutoff frequency of multistage amplifier.**
5. Define  $f_T$  in a high frequency transistor.
- 6. Why CB amplifier is preferred for high frequency signal when compared to CE amplifier?**
7. For an amplifier, mid band gain is 100 & lower cutoff frequency is 20KHz. Find the gain of an amplifier at frequency 20Hz.
8. For an amplifier, 3dB gain is 200 & higher cutoff frequency is 20KHz. Find the gain of an amplifier at frequency 100KHz.
9. Why common base amplifier is preferred for high frequency signal when compared to CE amplifier?
10. Draw the hybrid  $\pi$  equivalent circuit of BJTs.
11. What is the difference between small signal equivalent & hybrid  $\pi$  equivalent circuit.
12. What is high frequency effect?
13. What are the causes for occurrence of upper cutoff frequency in BJT?
14. Give equation of overall lower and upper cutoff frequency of multistage amplifier.
15. What is significance of octaves and decades in frequency response?
16. What are the causes for occurrence of upper cutoff frequency in BJT?
- 17. What is the major contribution to the Miller capacitance in a MOSFET?**
18. Define cut off frequency for a MOSFET.

### **PART B**

- 1. With the help of high frequency model of FET, derive the necessary expression for gain and bandwidth. (16) [MAY/JUN-14] [Nov/Dec - 12]**
- 2. Explain in detail about the calculation of overall upper and lower cutoff frequencies of multistage amplifiers. (8) [MAY/JUN-13] [Nov/Dec - 12] [NOV/DEC-13]**
- 3. Draw the high frequency equivalent circuit of FETs and analyze in detail. (8) [MAY/JUN-13] [NOV/DEC-14]**
4. Draw the high frequency pi model for a CE configuration and determine the high frequency current gain with short circuit and resistivity load. (16) [NOV/DEC-14]
5. Discuss the frequency response of MOSFET CS amplifier.
6. Determine the bandwidth of CE amplifier with the following specifications.  $R_1=100k\Omega$ ,  $R_2=10k\Omega$ ,  $R_C=9k\Omega$ ,  $R_E=2k\Omega$ ,  $C_1=C_2=25\mu F$ ,  $C_E=50\mu F$ ,  $r_{bb'}=100\Omega$ ,  $r_{b'e}=1.1K\Omega$ ,  $h_{fe}=225$ ,  $C_{b'e}=3pF$  and  $C_{b'c}=100pF$ .

## UNIT V - IC MOSFET AMPLIFIERS

### PART A

1. Mention the advantages of integrated circuits.
2. **What is active load? Where it is used and why?**
3. Justify the reasons for using current sources in integrated circuits.
4. Compare between CMOS and bipolar technologies.
5. **What is MOSFET current steering circuit?**
6. **What do you mean by current source & current sink?**
7. What is an active load in MOSFET devices?
8. Draw the CMOS CS amplifier with PMOS load.
9. Draw the PMOS active load I-V characteristics.
10. Draw the small signal equivalent circuit of CMOS CS amplifier
11. Define common mode and differential mode input resistance and voltages.
12. **What are the limiting factors for the maximum current in MOSFET?**
13. Define enhancement and depletion mode of MOSFET.
14. Define saturation and non- saturation bias regions.
15. How do you prove that a MOSFET is biased in the saturation region?
16. Draw MOSFET cascode current source circuit.
17. What is another name of two transistor current source?
18. Draw the two transistor MOSFET current source.
19. What is cascode current mirror?

### PART B

1. Describe the operation of an NMOS amplifier with either an enhancement load, a depletion load, or a PMOS load.
2. **Explain the basic MOSFET two transistor current circuits and discuss its operation.**
3. **Draw the MOSFET cascode current source circuit, explain and discuss the advantage of this design.**
4. Sketch and describe the advantages of a MOSFET cascode current source used with a MOSFET differential amplifier.
5. Design a CMOS differential amplifier with an output gain stage to meet a set of specifications. The magnitude of voltage gain of each stage is to be at least 600. Bias currents are to be  $I_Q = I_{REF} = 100\mu\text{A}$ , and biasing of the circuit is to be  $V_+ = 2.5\text{ v}$  and  $V_- = -2.5\text{ v}$ .
6. **Explain CMOS differential amplifier and derive CMRR.**
7. Describe the operation of a PMOS amplifier with an enhancement load, a depletion load.
8. Explain the CMOS common source and source follower with neat diagram.
9. Explain the large signal behavior of MOSFETs and compare the operating regions of Bipolar and MOS transistors.
10. Discuss the operation of active load and discuss the advantages of MOSFET cascode current circuit.
11. **Explain in detail about CMOS common source and source follower with neat diagram.**