Two Marks:

1. What are semiconductors?

 The materials, whose electrical properties lie between that of conductors and insulators, are known as semiconductors.

 The forbidden gap of semiconductor is about l eV. Example: Germanium, silicon

2. What are the types of semiconductor?

There are two types of semiconductor such as,

• Intrinsic semiconductor: Example. Ge and Si

• Extrinsic semiconductor

 N type semiconductor Example: Arsenic, Antimony

 P type semiconductor Example: Gallium, Indium

3. What do you meant by intrinsic semiconductor? Give two examples. (May/June 2007)

 A pure semiconductor is called as intrinsic semiconductor. Even at room temperature, some of the valence electrons may acquire sufficient energy to enter the conduction band to form free electrons.

 Under the influence of electric field, total current through the semiconductor will be possible.

Example: Ge and Si

4. What do you meant by extrinsic semiconductor? (May/June 2011)

 The electrical conductivity of pure semiconductor can be increased by adding impurity to it. The resulting semiconductor is called extrinsic semiconductor or impure semiconductor.

 Examples: silicon "Si" and germanium. "Ge" crystals with impurity atoms of As, Sb, P etc. (or) In B, Al etc.

5. What are called P and N type semiconductor? [Nov/Dec 2006]

 P- Type semiconductor: When a small amount of trivalent impurity (e.g. gallium, Indium) is added to pure semiconductor to get P-type semiconductor. Example: Gallium, Indium

 N-Type semiconductor: When a small amount of pentavalent impurity (e.g. Antimony, Arsenic) is added to a pure semiconductor to get N-type semiconductor.

6. Differentiate between intrinsic and extrinsic semiconductors. (May 2013)

Intrinsic Semiconductor	Extrinsic Semiconductor
It is pure semi-conducting material with no impurity atoms	It is prepared by doping a small quantity of impurity atoms to the pure semi-conducting material.
Examples: crystalline forms of pure silicon and germanium.	Examples: silicon "Si" and germanium. "Ge" crystals with impurity atoms of As, Sb, P etc
The number of free electrons in the conduction band is equal to no. of holes in valence band	The number of free electrons and holes is never equal. There is excess of electrons in n-type and excess of holes in p-type semiconductors.
Its electrical conductivity is low.	Its electrical conductivity is high.
Its electrical conductivity is function of	

temperature alone.
Its electrical conductivity depends upon the
temperature as well as on the quantity of
impurity atoms doped the structure.
7. What is the charge carriers found in P type and N type material?
 The charge carriers found in P type material
 Majority carriers = Holes
 Minority carriers = Electrons
 The charge carriers found in N type material are:
 Majority carriers = Electrons
 Minority carriers = Holes
8. How is a hole formed in a semiconductor? [May/Jun - 2007]
 At room temperature, some of the covalent bonds are broken due to the thermal energy supplied to the semiconductor crystal.
 Once the covalent bond is broken the electrons become free and are shifted to conduction band. The vacancy created in the valence band is called a hole.
 Whenever an electron is jumped up to the conduction band, a hole is created in the valence band.
9. What is forbidden energy gap? [Nov/Dec 2009]
 The energy gap between the valence band and conduction band is known as forbidden energy gap.
 If the width of the forbidden energy gap is greater the valence electrons are tightly bound to the nucleus and vice versa.
10. How do you increase the conductivity of the intrinsic semiconductor?
The conductivity of intrinsic semiconductor can be increased by adding the
impurity through the process known as doping.
11. What is meant by doping in a semiconductor?
 The process of adding impurity to the pure semiconductor to increase the electrical characteristics of semiconductor is known as doping.
12. Write about donor impurities?
 If a pentavalent substance is added as an impurity to germanium, 4 of the 5 valence electrons of the impurity atoms will occupy covalent bonds and the 5
th electron will be
available as a carrier of current.
 These impurities donate excess electron carriers and hence called donor or N-type impurities
13. Write about acceptor impurities?
 If a trivalent impurity is added to an intrinsic semiconductor, only three covalent bonds are filled and the vacancy in the fourth bond constitutes a hole.
 These impurities are known as acceptor or P-type impurities.
14. How conductivity increases with increase in temperature?
 Conductivity (σ) of an intrinsic semiconductor depends upon the number of hall electron pairs
and mobility.
 The number of electron-hole pair increases with rise in temperature while its mobility decreases. Hence the conductivity increases with increase in temperature.
15. Write the conductivity of N and P type semiconductor?
 The conductivity of an intrinsic semiconductor is given by, $\sigma i = ni(\mu n + \mu p) q$
 For n type semiconductor, as n>>p, the conductivity is given by, $\sigma = n \mu nq$
 For p type semiconductor, as p>n, the conductivity is given by, $p = p\mu pq$

16. What is a PN junction diode?
 A PN junction diode is a two terminal semiconductor device consisting of a PN junction formed either in germanium or silicon crystal.
 It is formed from a piece of semiconductor by diffusing P type material to one half side and N type material to other half side. The plane dividing two zones is known as a junction.
17. Draw the symbol of PN junction diode.
18. What is depletion region?
 The region around the junction from which the charge carriers are completely depleted is known as depletion region.
 Since this region has immobile ions, which are electrically charged, this depletion region is known as space charge region.
19. What is meant by forward bias?
 When the positive terminal of the battery is connected to P type and negative terminal to N type, the bias applied is called forward bias.
 Under forward bias, the holes are repelled by the applied positive voltage (VF), so holes move towards the junction. Similarly the electrons are repelled by the negative voltage.
 So electrons move towards the junction. Hence the depletion gets reduced.
20. What is meant by reverse bias?
 When the positive terminal of the battery is connected to N type and negative terminal to P type, the bias (i.e. voltage) applied is called reverse bias.
 The holes are attracted towards the negative of the applied voltage and electrons towards positive of the applied voltage.
 Here the depletion layer gets increased.
21. When does the PN junction diode acts as a switch or rectifier.
A PN junction diode is a two terminal device that is polarity sensitivity.
 Under the forward biased condition, the diode conducts. Therefore, the diode is ON.
 Under the reverse biased condition, the diode does not conduct. Therefore, the diode is OFF. Thus, an ideal diode acts as a switch.
22. Draw the V-I characteristics of PN junction diode under forward bias and reverse bias [May-2015]
21. Why Zener diode is often preferred than PN diode?
 When the reverse voltage reaches breakdown voltage in normal PN junction diode the current through the junction and the power dissipated at the junction will be high.
 Such an operation is destructive and the diode gets damaged. Hence the diodes can be designed.
22. What is Zener diode?
The diodes which can be designed with adequate power dissipation capabilities to operate in breakdown region is known as Zener diode. It is heavily doped than ordinary diode.
23. What is Zener breakdown?
 When the P and N regions are heavily doped, direct rupture of covalent bond takes place because of the strong electric fields, at the junction of PN diode.
 The new electron-hole pairs so created increase the reverse current. Thus, the breakdown of junction occurs. This type of breakdown is called Zener breakdown.
24. What is avalanche breakdown?
The breakdown caused by the breaking of covalent bonds due to collision of accelerated charges having large velocities and kinetic energy with adjacent atoms is termed as avalanche breakdown.
25. Draw the V-I characteristics curve for Zener diode.
26. Draw a simple Zener shunt regulator circuit diagram.

27. Give some applications of Zener diode.
 Used as voltage Regulator.
 Used as Peak clipper, square wave generator.
 Used as meter protection against accidental over voltage.
 Used as a fixed reference voltage in a circuit for calibrating voltmeters.
28. What is a Transistor?
Transistor is a semiconductor device that can amplify electronic signals such as radio and television signals. Transistor consists of two junctions formed by sandwiching either P type or N-type semiconductor between a pair of opposite types.
29. Why an ordinary transistor is called bipolar?
The operation of the transistor depends on both majority and minority carriers. So, a transistor is called a bipolar device.
30. Why transistor is so called?
 It is named as transistor which is an acronym of two terms: ―transfer-of-resistor.‖
 It means that the internal resistance of transistor transfers from one value to another values depending on the biasing voltage applied to the transistor.
 Thus it is called TRANSfer- resISTOR: i.e. TRANSISTOR.
31. What are the advantages of transistor over the vacuum tube?
Transistor has the following advantage than the vacuum tube such as,
 Smaller in size
 No filament and no need of power for heating filament
 Low operating voltage
 Higher efficiency
32. What are the types of transistor?
The types of transistor are,
 Unipolar Junction transistor (UJT)
 Bipolar Junction transistor (BJT)
33. What is a Bipolar Junction Transistor?
A Bipolar Junction Transistor is a three terminal semiconductor device in which the operation depends on the interaction of both majority and minority carriers.
34. Mention the applications of BJT.
The applications of BJT are:
 Used in amplifiers and oscillators
 Used as a switch in digital circuits
 Used in computers and satellites
35. What are the types of Bipolar Junction Transistor?
The two types of Bipolar Junction Transistor are,
 NPN transistor
 PNP transistor
36. What is NPN transistor?
In NPN transistor, P-type semiconductor is sandwiched between two n-type Semiconductors. The emitter region is made up of N-type semiconductor, base region is made of P-type semiconductor, and collector region is made of N-type semiconductor.
37. What is PNP transistor?
In PNP transistor, N-type semiconductor is sandwiched between two p-type semiconductors. The emitter region is made up of P-type semiconductor, base region is made of N-type semiconductor, and collector region is made of P-type semiconductor.
38. Why BJT is called a current controlled device?
The output voltage, current, or power is controlled by the input current in a transistor.

So it is called the current controlled device.

39. What are the three terminals in a BJT?

The three terminals in BJT are,

 Emitter (E)
 Collector (C)
 Base (B)

40. Enumerate the function of Emitter.

Emitter main function is to supply majority charge carriers. The emitter is always forward biased with respect to the base so that it is able to supply majority charge carriers to the base. The emitter is heavily doped so that it may be able to inject a large number of charge carriers.

41. What is the function of collector?

Collector main function is to collect majority charge carriers. Collector is always reverse biased so as to remove the charge carriers away from its junction with the base. It is moderately doped.

42. What is the function of base?

Base is the middle section of the transistors and is very lightly doped. It is very thin so that it may pass most of the injected charge carriers to the collector.

43. Collector region of a transistor is larger than emitter. Why? [May/June 2007, 2012]

Collector is made physically larger than emitter and base, because collector dissipates more power than emitter.

44. Will a transistor result if two diodes are connected back to back?

A transistor has two p-n junctions. One junction is between the emitter and the base and is called emitter base junction and the other junction is between the base and the collector and is called collector base junction. Thus transistor is like two PN junction diodes connected back to back.

45. What is biasing? What is the need for biasing? [May/June 2014]

 Applying external voltage to a transistor is called biasing. In order to operate transistor properly as an amplifier, it is necessary to correctly bias the two PN junctions with external voltages.

 In a transistor, emitter-base junction is forward biased and collector-base junction is reverse biased.

46. Define the different operating regions of transistor.

The operating regions of transistor are

Active region - EB junction is forward biased
CB junction is reverse biased

Cut-Off region - EB junction is reverse biased
CB junction is reverse biased

Saturation region - EB junction is forward biased
CB junction is forward biased

47. What do you mean by configuration? What are the types of transistor configuration?

The way in which transistors are connected in a circuit is called as configuration. There are three types of transistor configuration such as

 Common base (CB) configuration
 Common Collector (CC) configuration
 Common Emitter (CE) configuration

48. Draw the equivalent circuit of CE, CB and CC configuration. [May/June 2011,2007]

Fig: Common Emitter Fig: Common Base Fig: Common collector

49.Explain about the characteristics of a transistor.

Input characteristics: It is drawn between input voltage & input current while keeping output voltage as constant.

Output characteristics: It is drawn between the output voltage & output current while keeping input current as constant.

50.Define Early effect. [Dec 2010,15] [Dec 2005], [May 2016&2017]

In the common Base characteristics of BJT when reverse bias voltage VCB increases, the width of the depletion region also increases. This reduces the efficient base width. This effect is called "Early Effect" or "Base width modulation".

51. What are the consequences of early effect? [June 2010]

The Early effect has three consequences.

 There is less chance of recombination within the base region.

 The charge gradient is increased within the base and consequently the current of the minority carriers injected across the junction increases.

 For extremely large voltages, the effective base width may be reduced to zero, causing breakdown in the transistor. This phenomenon is called the punch through.

52. Define Punch through (or) Reach through.

For extremely large reverse voltage, the effective base width may be reduced to zero, causing voltage breakdown in the transistor. This phenomenon is called Punch Through (or) Reach Through.

 If a transistor is to be used as a linear amplifier, it should be operated in the active region.

53.Which is the most commonly used transistor configuration? Why? (Dec2017)(May/June 2007)

The CE configuration is most commonly used. The reasons are due to:

 High current gain

 High power gain

 High voltage gain

 Moderate input to output ratio.

54.Draw the characteristics of CE transistor.

55. Which amplifier is called as voltage follower? Why?

1. What is Biasing?

 The process of giving proper supply voltages and resistances for obtaining the desired Q-Point is called Biasing.

 For proper operation, emitter-base junction should be forward biased and Base-collector Junction should be reverse biased.

2. What is operating point? (Nov 2016, Nov 2017)

The voltages (VCEQ) and current (ICQ) which set to operate the transistor in the active region are called quiescent values. These quiescent values determine the operating point or Q-Point for the transistor.

3. What are the techniques used to establish the operating point in active region?

Compensation and stabilization techniques are needed to establish the operation point in active region.

4. What is the effect of temperature on Q-Point?

Q-Point tends to shift its position due to any (or) all of the following three main factors.

a) Reverse Saturation current ICO which doubles for every 10

0
c increase in temperature.
b) Base-Emitter Voltage VBE decrease by 2.5mV/
0C
c) Transistor current Gain, β increase with temperature.
5. What is reverse Saturation Current [ICO (or) ICBO]?
Reverse saturation current is the current flowing through reverse biased collector-base junction that is the
collector to base leakage current with emitter open.
6. What is Thermal Runway? (Nov 2017, MAY 2014, NOV 2011)
How thermal runaway occurs in a transistor? (NOV 2018)
The problem with increasing temperature causing increasing collector current is that more current increase
power dissipated by the transistor which, in turn, increases its temperature. This self reinforcing cycle is
known as thermal runaway.
7. Define Stability Factor. (NOV 2012, MAY 2012, NOV 2011, MAY 2010, MAY 2009, Nov 2015,
May 2017, May 2019)
Stability factor, S is defined as the rate of change of collector current, IC with respect to the collector –base
leakage current, ICO Keeping both the current, IB and Current gain as constant.
S=ΔIc/ΔIco Keeping β and IB as constant
8. What are the types of BJT biasing? (NOV 2019)
1) Fixed Bias (or) Base Resistor Method 2) Collector to Base Bias (or) Biasing with Feedback Resistor
3) Self-Bias (or) Emitter Bias (or) Voltage Divider Bias
2
9. What are the advantages and disadvantages of Fixed Bias?
Advantages:
1. Simplicity
2. Small Numbers of Components Required
3. If supply voltage is very large compared to VBE than IB is independent to VBE.
Disadvantages:
1. Stability Factor S = 1+β
Since is large quantity, this is very poor stable circuit and so not widely used for biasing the base.
10. Write the disadvantages of collector to base bias? (MAY 2006)
1. Stability is very poor if collector resistance is very small.
2. Hence, it is not used for amplifier circuits like transformer coupled amplifiers.
11. How self-bias circuit used as a constant current circuit?
How stability is maintained in self-bias circuit?
If collector current increases also emitter resistance increases. Hence the voltages drop across RE
increases thereby decreasing the base current IB. As a result IC is maintained almost constant.
12. Compare all the biasing circuits with respect to stability factor?
How the Self-bias circuit over comes the other types?
Write the advantages of Self- Bias.

In Fixed Bias and Collector to Base Bias, stability factor value is very large which leads to poor stability.
Hence Fixed Bias and Collector to Base Bias are not preferred for Biasing.
In Self- Bias method, when RB/RE is Very small, S=1 (Approx.) which provides good stability. Hence SelfBias method is the best one over other types of biasing.
13. What are the types of Bias Compensation Techniques?
1. Diode Compensation
2. Thermistor Compensation
3. Sensistor Compensation
14. What is diode compensation? (April 2018)
Diode compensation is a technique that is used to reduce the Q-point variations by selecting a diode that
has temperature characteristics similar to the transistor.
15. When does a transistor act as a switch? (NOV 2018)
When a transistor works as a switch it works in cutoff and saturation regions.
16. Why silicon is most widely used semiconductor material?(APRIL/MAY 2010)
1. Silicon has low leakage current, ICO
0.01 µA to 1 µA
2. Greater working temperature 150
0C
1. Germanium has high leakage current
ICO 2 µA to 15 µA
2. lower working temperature 70
0C
3
17. What is early effect (or) base width modulation? (NOV 2019)
A greater reverse bias across the collector-base junction increases the collector-base depletion width, thus decreasing the width of the charge neutral portion of the base.
18. What is reach through (or) punch through? (MAY 2014)
An emitter-to-collector breakdown which can occur in a junction transistor with very narrow base
region at sufficiently high collector voltage when the space-charge layer extends completely across
the base region.
19. What do you understand by DC & AC load line? What is an ac load line? (Nov 2016)
What is the slope of AC load line? (NOV 2018)
DC Load Line
It is the line on the output characteristics of a transistor circuit which gives the values of IC & VCE
corresponding to zero signal (or) DC Conditions.
AC Load Line
This is the line on the output characteristics of a transistor circuit which gives the values of IC &
VCE when signal is applied. The slope of AC load is -1/Rac. where Rac=Rc paralel with load resistance.
20. What are the factors that affect the Q point of the circuit?(NOV 2009, May 2019)
β, ICO, VBE are the parameters varying with the temperature. These are the factors that affect the Q
point of the circuit.
21. Why do you fix Q point in the middle of dc load line? (Nov 2015, Nov 2005)

What is the function of the Q point? (NOV 2013)
The operating point of a transistor is kept fixed usually at the center of the active region in order
that the input signal is well amplified.
If the point is fixed in the saturation region or the cut off region the positive and negative half cycle
gets clipped off respectively.
22. What is the need for biasing in transistor amplifier?(APRIL 2011, NOV 2008)(APRIL 2004)
When a transistor is biased properly, it works efficiently and Produces no distortion in the output
signal of the amplifier and thus operating point can be maintained stable.
23. What are the transistor parameters that vary with the temperature?
β, ICO, VBE are the parameters varying with the temperature.
24. Why is it necessary to stabilize the operating point of transistor?(NOV/DEC 2005)
List the importance of selecting the proper operating point. (MAY 2015)
 For faithful amplification it is necessary to stabilize the operating point of transistor.
 To avoid distortion.
4
25. What are all the factors that affect the stability of the operating point?
What are the factors against which an amplifier needs to be stabilized? (DEC 2014)
The following are the factors that affect the stability of the operating point,
a. Change of Q due to replacement of transistors (change of Q due to change of transistors parameters (VBE, ICO,β)).
b. Thermal variations.
26. How can collector current be stabilized with respect to ICO variations?(NOV/DEC 2010)
The collector current IC with respect to the reverse saturation collector current ICO variation is
stabilized by, keeping „VBE‟ and „β‟ constant.
Collector current can be stabilized with respect to ICO variations using stabilization and compensation techniques.
27. Draw the various bias circuits.
Draw the fixed and self bias circuits. (NOV 2008)
Fixed bias Collector to base bias Self bias
28. Define fixed bias, collector to base bias.
Fixed bias: The circuit is called as a “fixed current bias circuit”, because the transistors base current, IB remains constant for given values of VCC, and therefore the transistors operating point must
also remain fixed.
Collector to base bias:
In this circuit, the base bias resistor, RB is connected to the transistor‟s collector, instead of to the
supply voltage rail, VCC.
29. Why voltage divider bias is commonly used in amplifier circuit?
The voltage divider bias has the following advantages
a. The operating point will be in stable position.
b. The stability will be considerably improved.
c. IC can be reduced to the collector leakage current ICO.

Unit-II: Amplifiers Two Marks Questions & Answers
1
Stabilization Techniques Compensation Techniques
Resistor biasing circuits are used which allow IB
to vary so as to keep IC relatively constant with
variations in hfe, ICO and VBE.
Temperature sensitive devices such as diodes,
transistors are used which provide
compensating voltages and currents to maintain
the operating point constant.
30. What is meant by stabilization?
The operating point can be made stable by keeping IC and VCE constant. There are two techniques to make Q
point stable.
31. Why input impedance of MOSFET is higher than that of FET?
Input impedance of MOSFET is higher than JFET because of gate is insulated from the channel by a thin
layer of silicon dioxide.
32.Why h-parameters are used to analyses small signal transistors?
The dimensions of the hybrid parameters are not alike, that is they are hybrid in nature so they are called
hybrid parameters.
h11 = [V1/I1] at V2=0; h11 = Input impedance with output port short circuited.
h12 = [V1/V2] at I1=0; h12 = Reverse voltage gain with input port open circuited.
h21 = [I2/I1] at V2=0; h11 = Forward current gain with output port short circuited.
h22 = [I2/V2] at I1=0; h11 = output impedance with input port open circuited.
33. What are the benefits and limitations of h-parameters?
List the advantages of h parameter. (NOV/DEC 2014)
Features/Advantages of hybrid parameters are,
a. h parameters are real numbers,
b. They are easy to measure.
d. Easily convertible from one configuration to other
e. Readily supplied by manufactures
34. Limitations of h-parameters:
a. The accurate calculation of h parameters is difficult.
b. A transistor behaves as a two port network for small signals only.
35. How are amplifiers classified according to the transistor configuration? (Nov 2015)
Three amplifiers according to the transistor configuration:
 Common collector amplifier (or) Emitter follower
 Common emitter amplifier
 Common base amplifier
36. Explain the function of bypass, unbypass capacitor in a CE amplifier circuit. (May 2004)
What is bypass and coupling capacitor? (Nov 2017)
Coupling capacitor – It is used to block dc and allow ac components.
Bypass capacitor— It provides low impedance path for ac current from emitter to ground, acting as a
perfect short circuit.
Coupling and bypass capacitors reduce amplifier’s gain at low frequencies.

37. What about the characteristics of common emitter amplifier? May/June 2014
Why are CE amplifiers more popular? (Nov 2011, May 2019)
Why CE configuration is preferred for amplification? (April 2018)
The Common-Emitter is characterized as having
 High input impedance and
 Low output impedance with
 High voltage & current gain and high power gain.
38. Give the application of the CE amplifier.
Used as high gain amplifier and audio amplifier.
39. Draw the small-signal ac equivalent circuit of the BJT. (Nov 2016)
40. Draw the small signal equivalent circuit of CE amplifiers. Nov/Dec 2012
41. What about the characteristics of common collector amplifier? Nov/Dec 2013
The input resistance is very high.
The output resistance is very low.
The voltage gain is approximately 1.
The power gain is approximately equal to the current gain(Ai).
42. Which amplifier is called as voltage follower? Why?
The common collector transistor amplifier is called as voltage follower.
Since it has unity voltage gain and because of its very high input impedance. So, the input signal is
coupled to the output circuit without making any distortion.

43. Draw the small signal equivalent circuit of CC amplifiers.
44. Give the application of the CC amplifier.
Used as buffer amplifier. This makes it useful for driving low impedance loads.
45. What about the characteristics of common base amplifier?
The input resistance is very low.
The output resistance is very high.
The voltage gain is high.
The current gain (Ai) is approximately 1.
The power gain is approximately equal to the voltage gain (Av).
46. Draw the small signal equivalent of CB configuration. (April 2014)
47. Give the applications of the CB amplifier. Nov/Dec 2011
CB circuit is used as a unity-gain current amplifier or current buffer,
Used in High-frequency applications.
48. Compare characteristics of CB, CE and CC transistor circuits. Nov/Dec 2011

Parameter	CB	CE	CC
Zi	Low	Medium	High
Zo	High	High	Low
Av	High	High	Low(Av =1)
Ai	Low(Ai =1)	High	High
Power gain	High	Very high	High
Phase shift	No	180 degree	No
Application	High frequency applications	Voltage amplifier	Buffer amplifier

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s
49.What is body effect in MOSFET? How does it change the small-signal equivalent circuit of the
MOSFET? [May June– 2016]
The body effect in a MOSFET in which the substrate or body is not connected to the source. For
an NMOS, the body is connected to the most negative potential in the circuit and will be at signal ground.
If an ac component exists in the source-to body voltage, VSB, there will be an ac component will be
included in the threshold voltage, which causes an ac component in the drain current.
50.Write the expression for basic current equation in MOSFET?
The region for which vds < vds(sat) is known as Non saturation region,
id = kn[2(vgs-vtn)v v 2
].
In the saturation region,the ideal current - voltage characteristics for vgs > vtn are given by the
equation ,id = kn(vgs-vtn)
2
51.Write two reasons why a hybrid parameter model is used in small signal analysis.
The h parameters are determined by short circuiting the output and open circuiting the input.
This method of analyzing transistor circuits makes easier for designing a circuit.
The hybrid parameters are more popular in transistor circuit analysis, because it has mixed dimensions.
52.Sketch the simple common source amplifier circuit of MOSFET?
D-MOSFET E-MOSFET
53.What are the basic circuit configurations used in MOSFET?
There are 3 basic MOSFET circuit configurations, they are
i. Common Source(CS)
ii. Common Gate(CG)
iii. Common Drain (CD)

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Unit-II: Amplifiers Two Marks Questions & Answers
54.Compare the characteristic of small signal amplifier with large signal amplifier.

Small signal amplifier	Large signal amplifier
Input signal is so weak as to produce small fluctuations in the collector current compared to its quiescent value, the amplifier is known as small signal amplifier.	When fluctuation in collector current is large i.e., beyond the linear portion of characteristics of the amplifier, is called as large signal amplifier.

55.Compare the AC circuit characteristics of the CS, CG and (source follower) CD.
Characteristics of the three MOSFET amplifier configurations.
Configuration Voltage gain Current gain Input
resistance
Output
resistance
Common
source
Av > 1
Av ≈ 1
-
-
RTH
RTH
Moderate to high
Low
Source
follower
Common gate Av > 1 Ai ≈ 1 Low Moderate to high
56.List out the applications of MOSFET?
i. Heat sink and cooling within a computer most MOSFETs are located on the microprocessor chip, mounted on the motherboard and conspicuously cooled by its own heat sink and cooling fan.
ii. Microprocessor chip The microprocessor chip itself is mounted in an electronic package with hundreds of interconnecting pins and connected to the chip by hundreds of tiny bond wires.
iii. Chip cross-section A cross-section of the chip reveals multiple layers of tiny wires above the MOSFETs which are embedde4d in the silicon substrate.
57. What are the effects of emitter bypass capacitor on high frequency response? [Nov/Dec 2022]
At lower frequencies, the bypass capacitor CE is not a short. So, the emitter is not at ground. Xc in parallel with RE (RS incase of FET) creates an impedance. The signal voltage drops across this
impedance reducing the current gain
1. What is meant by feedback?
A portion of the output signal is taken from the output of the amplifier and is combined with the normalinput signal. This is known as feedback.
2.Give the two types of feedback.
Two types of feedback
1.Positive feedback
2.Negative feedback.
3. Define the positive feedback.
When input signal and part of the output signal are in phase, the feedback is called Positive feedback.
4. What is negative feedback? (Nov 2014)
When input signal and part of the output signal are in out of phase, the feedback is called negative feedback.
5. What type of feedback is used in oscillator?
Positive feedback is used in oscillator.
6. What type of feedback is used in amplifier?

Negative feedback is used in amplifier.
7. Give classification of amplifiers.
Amplifiers can be classified into four broad categories: voltage amplifier, current amplifier, transconductance amplifier and transresistance amplifier.
8. What is node sampling?
When the output voltage is sampled by connecting the feedback network in shunt across the output, theconnection is referred to as voltage or node sampling.
9. What is loop sampling?
When the output current is sampled by connecting the feedback network in series with the output, the
connectionis referred to as current or loop sampling.
10. What is transfer gain?
(or)What is transfer
ratio?
Transfer ratio is the ratio of the output signal (Xo) to the input signal (Xi). It is denoted by A.A=Xo/Xi
11. Define loop gain or return ratio. (Nov/Dec 2011, Apr/May 2011)
The loop gain or return ratio is the product of the gain of the feedforward system (A) and the feedback
factor (β).
12. Define feedback factor of a feedback amplifier. May/June 2012
Define feedback ratio of a feedback amplifier. Nov/Dec 2011, Apr/May 2011
Feedback factor (feedback ratio) is defined as the ratio of the feedback voltage (Vf) to output voltage (Vo).(Feedback ratio)□=Vf/Vo
13. Identify the type of feedback of the circuit shown. (Nov/Dec 2009)
This circuit is a voltage shunt feedback because output is voltage and feedback is connected at input
terminal.
14. Mention the three networks that are connected around the basic amplifier to implement feedback
concept.(Nov/Dec 2012, Apr/May 2017)
Derive using a block diagram the closed loop forward transfer ratio Af of a feedback system. (Nov/Dec
2003)
A negative feedback system consists of four components: 1) feed forward system (basic amplifier)
2) Sense mechanism (sampling network) 3) feedback network, and 4) comparison mechanism.
15. List the effects of positive feed back.
Effects of positive feedback are
□ Instability of an amplifier is increased.
□ Bandwidth is reduced.
□ Distortion and noise are increased.
16. List the characteristics of Negative Feedback amplifiers. (Nov/Dec 2007)
Mention two advantages of Negative Feedback. (Nov/Dec 2006) (Apr/ May 2004) (NOV 2019)
List out the properties of negative feedback amplifier. [APRIL-2015] [May 2021]
□ Gain is stabilized
□ Nonlinear distortion is reduced
□ Noise is reduced

 Control the input and output impedance
 Bandwidth is improved

17. What is the effect of lower cut-off frequency with negative feedback?
Lower cutoff frequency with feedback is less than lower cutoff frequency without feedback by
factor(1+Amid β)

18. What is the effect of upper cut-off frequency with negative feedback?
Upper cutoff frequency with feedback is greater than upper cutoff frequency without feedback by
factor(1+Amid β)

19. What is the effect of negative feedback on bandwidth?
Bandwidth of an amplifier with feedback is greater than bandwidth of an amplifier without feedback.

20. Why gain bandwidth product remains constant with the introduction of negative feedback?
Bandwidth with negative feedback is increased by factor (1+A β) and gain is decreased by same factor,the gain-bandwidth product of an amplifier does not altered, when negative feedback is
introduced.

21. What is the effect of negative feedback on noise in circuits? (Apr/May 2010, Apr/May 2017)What will happen for noise, if we introduce negative feedback at amplifiers? (Nov 2016) Noise with negative feedback is decreased by a factor of (1+ A□)

22. What is the effect of negative feedback on the input and output impedance of a voltage series and
current series amplifier ? (NOV 2021) Distinquish series and shunt feedback. (April 2018) Compare the input and output resistance for a voltage and current shunt feedback amplifier. (Nov
2008)

Characteristics	Type of feedback			
	Current-series	Voltage-series	Voltage-shunt	Current-shunt
Voltage gain	Decreases	Decreases	Decreases	Decreases
Bandwidth	Increases	Increases	Increases	Increases
Input resistance	Increases	Increases	Decreases	Decreases
Output resistance	Increases	Decreases	Decreases	Increases

23. What happens to the input resistance based on type of feedback in an amplifier? (May/June 2009)
Input resistance is increased
(Rif) Output resistance is
decreased (Rof)

24. Name four types of basic feedback topologies and give example. (May/ June 2006)
Four types of basic feedback topologies are
 Voltage Series feedback – Emitter follower circuit
 Voltage shunt feedback – CE amplifier with resistor, R between output and input.
 Current series feedback – CE amplifier with unby passed RE
 Current Shunt feedback – Two transistors in cascade with feedback from second emitter to first basethrough resistor, R

25. What is the effect on input and output impedance of an amplifier if it employs voltage series

feedback?May/June 2013
Input impedance is increased. Rif = Ri(1+ Aβ) Output impedance is decreased. Rof = Ro/ 1+ Aβ
26. Compare the input and output impedance for a voltage shunt and current shunt feedback amplifier?Nov/Dec 2008
For voltage shunt feedback amplifier:
Input impedance is decreased. Rif = Ri/ 1+ Aβ Output impedance is decreased. Rof = Ro/ 1+Aβ
For current shunt feedback amplifier:
Input impedance is increased. Rif = Ri(1+ Aβ) Output impedance is decreased. Rof = Ro/ 1+ Aβ
27. What are the steps to be carried out for complete analysis of a feedback amplifier? (May/June 2009)
Steps are
1. Identify the type of feedback
2. Redraw the amplifier circuit without the effect of feedback.
3. Use a thevenin's source at the input for series mixing and use a Norton's source at the input
for shuntmixing.
4. After drawing the amplifier circuit without feedback determines the ac parameters of the circuit
using the hparameter model.
5. Determine the feedback ratio □= xf / xo.
6. Find the desensivity factor (D).
7. Find Voltage gain Af, input resistance Rif , output resistance Rof.
28. State the Nyquist criterion to maintain the stability of negative feedback amplifier.(Nov/Dec 2010)State Nyquist stability criterion. [APRIL-2015]
Nyquist criterion is that the amplifier is unstable if the curve encloses the point – 1 + j0, and the
amplifier is stableif the curve does not enclose this point.
29.Define oscillator.
An oscillator is a circuit which generating the output signal with constant amplitude and desired
frequency without ac input using positive feedback.
30. What are the classifications of oscillators?
Based on waveform generated: (i) Sinusoidal oscillator (ii) Non-sinusoidal oscillator
According to principle involved: (i) Negative resistance Oscillator (ii) Feedback oscillator
31. Name two low frequency Oscillators. (Nov 2017)
Two low frequency oscillators are
a. RC phase shift oscillator
b. Wein bridge Oscillator.
32. Name two high frequency Oscillators. (Nov 2017)
Two high frequency Oscillators are
a. Hartley Oscillator
b. Colpitts Oscillator
c. Clapp's oscillator
d. CrystalOscillator
33. State the Barkhausen Criterion. (May-2010, May-2012, 2014,2015, 2017) (Nov 2017, NOV 2019)

What are the conditions for oscillation? (NOV 2021), (Nov 2006, 2011), (May 2006), (May 2021)
Barkhausen criterion conditions are:
(i). Total phase shift produced by the circuit should be 360o
or 0
o
(ii). Magnitude of loop gain must be greater than or equal to 1(i.e. □A□□= 1.)
34. How does an oscillator differ from an amplifier?
Oscillator Amplifier
O s c i l l a t o rs are self-generating circuits. Amplifiers
circuits.
are not self-generating
It has infinite gain It has finite gain
Oscillator uses positive feedback. Amplifier uses negative feedback.
35. State the advantages and disadvantage of RC phase shift Oscillator. (Apr/May-2008, April 2016,
Nov.2016, April 2017)
Advantages:
 Fixed frequency oscillation
 Circuit is simple to design
 Can produce output in audio frequency range.
Disadvantages:
 Frequency stabilityis poor.
Frequency cannot be varied
36. How is amplitude stabilization performed in wein bridge oscillators? (Apr/May2009)
The amplitude stability can be improved using a nonlinear resistor R4 (In the above figure). Whennon linear resistor value increases, a greater amount of negative feedback is applied. This reduces
the loop gain. Hence signal amplitude gets reduced and controlled.
37. What is the need for amplitude control in oscillator? [May 2019], [May 2021]
Amplitude control is needed to produce constant amplitude output in oscillator. Also it is necessary to minimize the distortion and reduce the output amplitude within the acceptable range.
38. Compare RC Phase shift and Wein bridge Oscillator.
Write an advantage of wien bridge oscillator over RC phase shift oscillator?[APRIL-2015]
Comparison of RC oscillator:
RC phase shift Oscillator Wein bridge Oscillator.
Feedback network introduces 180□phaseshift Feedback network does not introduce any phase shift
Feedback network is RC network with three
RC sections
Feedback network is lead-lag network which
The frequency of oscillations is,
f = 1 / 2□□6RC,□A□□29
The frequency of oscillations is,
f = 1 / 2□RC,□A□□3
Frequency variation is difficult Frequency can be varied
39. What is meant by resonant Circuit (LC) Oscillators?
LC oscillators are known as resonant circuit oscillator because the frequency of operation of LC

Oscillator is a resonant frequency of tank circuit.
LC tank circuit produces sustained Oscillation at the resonant circuit oscillator.
40. Why LC oscillator is preferred over RC oscillator at radio frequencies? (April 2015)
At high (radio) frequencies, the value of inductor becomes small. The small inductor is smaller
in size. It decreases size and cost of the circuit. Hence LC oscillators are used for radio frequency
ranges.
41. Why LC oscillators are not used for low frequency range?
At low frequencies, the value of inductor is large. The large inductor is larger in size and occupies lot of space. It increases size and cost of the circuit. Hence LC oscillators are not used for low
frequency ranges.
42. State the advantages of Clapp oscillator over colpitts oscillator. (Nov/Dec-2004, APRIL-2015)
The advantages are,
 The frequency is stable and accurate.
 Good frequency stability.
 The stray capacitances have no effect on C3 which decides the frequency.
 Keeping C3 variable, frequency can be varies in the desired range.
43. Give the comparison between RC and LC oscillators.

S.NO	RC oscillators	LC oscillators
1.	Frequency of oscillations is dependent on values of R and C	Frequency of oscillations is dependent on values of L and C
2.	These are used at low and medium frequencies	These are preferred at high frequencies
3.	Phase shift and wein bridge oscillators are the examples of RC oscillators	Hartley, colpitt's and clapp oscillators are the examples of LC oscillators

43. Define frequency drift. (Apr/May2010)
Frequency drift is defined as change in frequency due to change in temperature, variation in power
supply, biasing conditions, change in climatic condition and aging of components.
44. How the frequency stability can be improved in the oscillators?
The frequency stability can be improved by the following modifications:
 Enclosing the circuit in a constant temperature chamber.
 Maintaining constant voltage by using the zener diode.
 The load effect is reduced by coupling the oscillator with the help of a circuit having high input
impedance and low output impedance.
45. Define frequency stability of an oscillator. (May/June-2009)
The measure of ability of oscillator to maintain the desired frequency as precisely as possible for a
long times called frequency stability of an oscillator.
46. What is piezoelectric effect? (Nov/Dec-2007) , (May/June-2006)

The piezoelectric effect means under the influence of the mechanical pressure, the voltage gets
generated across the opposite faces of the crystal.
If the mechanical force is applied in such a way to force the crystal to vibrate, the a.c. voltage gets generated across it.
Conversely, if the crystal is subjected to a.c. voltge, it vibrates causing mechanical distortion in
the crystal shape.
47. Draw the electrical equivalent circuit of crystal. (May 2007, NOV2009, April 2015, May 2019)Draw and explain the electrical equvalent circuit of quartz crystal. (MAY 2014)
Equivalent Circuit of Crystal:
Where R- resistor, L – Inductor, C – Capacitor and Cm – Miller (Mount) capacitance
48. Mention the features of crystal oscillator. (April/May-2005)
The features of crystal oscillators are,
 Frequency stability is very good.
 Frequency drift is very small of the order of 0.0001% per day.
 Aging rate of crystal is less.
 Accurate and constant frequency can be achieved.
49. What are the advantages of crystal Oscillators over other Oscillator?(MAY/JUNE 2005)
To maintain the output frequency of an oscillator at a constant value, a crystal may be used to control the frequency of oscillation.
50. How the crystal oscillator maintains stable frequency? (Nov/Dec-2005)
Every crystal has its own resonating frequency depending on its cut. So under the influence of
the mechanical vibrations, the crystal generates an electrical signal of very constant frequency. The
crystal has a greater stability.
51. List the disadvantages of crystal Oscillator.
Disadvantages of crystal oscillator are
 It is suitable for only low power circuits
 Large amplitude of vibrations may crack the crystal.
52. Give few applications of crystal oscillator.
The applications of crystal oscillator are,
 Computers & Counters
 Basic timing devices in electronic wrist watches etc.
53. What are the advantages of LC oscillator and RC oscillator?(May/June-2007)
Advantages: RC Oscillator
 The circuit is simple to design.
 Can produce output over audio frequency range.
 Fixed frequency oscillator.
Advantages: LC Oscillator
 Good frequency stability
 Frequency can be varied.
 Q factor of the resonant circuit is almost free from degradation
List out the classification of large signal amplifiers. The large signal amplifiers are classified as follows.
3. Mention the important features of power amplifier. (NOV 2016) It improves power level of the input signal It is used as last stage of amplifier.
chosen at the midpoint of AC load line and biased.
5. Give the applications of class C power amplifier. (NOV/DEC 2011)

The applications of class C power amplifier are,
a. Used in radio and TV transmitters.
b. Used to amplify the high frequency signals.
c. Tuned amplifiers
6. Give the two draw backs of class C amplifier.
The drawbacks of class C amplifier are,
a. Distortion is high.
b. Figure of merit is low.
7. Define the following modes of operation (a) Class AB (b) Class C.
a. Class AB
In this mode of operation, the output current flows for more than one half cycle but less than full cycle.
b. Class C (NOV/DEC 2013)
In this mode, the level current flows for less than one half cycled i.e., ¼ th of the input cycle.
8. Define Class B mode of operation and its advantages and disadvantages.
Class B mode of operation
The biasing signal and input signal flow through the circuit for half cycle i.e., 180o
. Advantages
a. Efficiency is increased from 25% to 78.5%
b. Due to push pull configuration all even harmonics are reduced.
c. Due to centre-tapped transformer at input and output, the core saturation loss is reduced.
Disadvantages
a. Transistor is biased above the cut off region
b. Due to the centre-tapped transformer at both input and output, the circuit becomes complex.
4. How do you bias the class A operation?/ which power amplifier gives minimum distortion? why? (NOV 2019)
In class A mode, the output current flows throughout the entire period of input cycle and the Q point is
1. Define power amplifier.
An amplifier handling large signal is called large signal amplifier or power amplifier.
 Class A amplifier Class B amplifier Class C amplifier Class AB amplifier
UNIT V POWER AMPLIFIERS AND DC/DC CONVERTERS
Power amplifiers- class A-Class B-Class AB-Class C-Power MOSFET-Temperature Effect-Class AB Power
amplifier using MOSFET –DC/DC convertors – Buck, Boost, Buck-Boost analysis anddesign.

9. State the merits of using push pull configuration.
The merits of push pull configurations are,
a. Efficiency is high (78.5%)
b. Figure of merit is high
c. Distortion is less.
d. Ripple present in the output due to power supply is multiplied.
10. What are the advantages of using complementary symmetry configuration?
The advantages of using complementary symmetry configuration are,
a. It does not use centre-tapped transformer either at input or output.

b. It uses one PNP transistor and one NPN transistor hence it provides proper impedance matching.
Hence its voltage gain is unity.
11. Define conversion efficiency of a power amplifier. (MAY 2014), (Nov 2008, 2013)
The ratio of the AC output power delivered to the load to DC input power applied is referred to as conversion efficiency. It is also called as collector circuit efficiency in case of transistor amplifier.
12. Write down the values of maximum possible power conversion efficiency and operating point for class A direct coupled and transformer coupled. (April 2011)
For class A direct coupled efficiency is 25%
For class A transformer coupled efficiency is 50%
Operating point is located at the middle of the load line.
signal should exceed the barrier voltage to make the transistor conduct. Otherwise the transistor doesn'tconduct. So there is a time interval between positive and negative alternations of the input signal whenneither transistor is conducting. The resulting distortion in the output signal is cross over distortion.
14. How cross over distortion is eliminated? (April 2018, April 2016)
To avoid cross over distortion, a light forward bias (0.3Vfor ge & 0.7V for Si) voltage is applied to the emitter junction of both the transistors. It causes transistor to conduct immediately when the input signal is applied. So, Q point is fixed above cut off.
15. Show that the even harmonics are cancelled at the output of a push pull class B amplifier. (NOV 2018)
Total Harmonics distortion, %D= 2 2 2 D D D 3 5 7 □ □ □ □ □ X100
16. Justify, "The class C power amplifiers are not used as output stage of an audio frequency amplifier". Why? (NOV 2016)
No, class C power amplifiers are not used as output stage of an audio amplifier because it's suitable only