CIT236 - ANALOGUE AND DIGITAL ELECTRONICS SUMMARY

A _____ is a three-terminal semiconductor device that can be used for amplification and switching.
transistor

A transistor is a _____-terminal semiconductor device that can be used for amplification and switching.
three

A transistor is a three-terminal _____device that can be used for amplification and switching.
semiconductor

A transistor is a three-terminal semiconductor device that can be used for _____and switching.
amplification

A transistor is a three-terminal semiconductor device that can be used for amplification and_____.
Switching

A transistor is a three-terminal semiconductor device that can be used for_____ and_____.
amplification and switching

OPAMPS means_____
Operational Amplifiers

_____ consists of magnifying a signal by transferring energy to it from an external source
Amplification

A _____ is a device for controlling a relatively large current between or voltage across two terminals by means of a small control current or voltage applied at a third terminal.
transistor switch

There are _____ major families of transistors
Two

There are two major families of transistors are _____

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bipolar junction transistors, or BJTs and field-effect transistors, or FETs

The _____ acts essentially as a current-controlled device
BJT

The _____ behaves as a voltage-controlled device.
FET

BJT means_____
Bipolar Junction Transistor

The _____ forms the basis of a large number of semiconductor devices.
pn junction

A _____ is formed by joining three sections of semiconductor material, each with a different doping concentration.
BJT

The three sections can be either a thin nregion sandwiched between p+ and p layers, or a p region between n and n+ layers, where the superscript "plus" indicates more heavily doped material. The resulting BJTs are called _____
pnp and npn transistors

The _____acts very much like a diode when it is forward biased
Base-emitter (BE) junction

The operation of a pnp transistor is completely similar to that of the npn device, with the roles of the charge carriers (and therefore the signs of the currents)_____.
Reversed

Transistors can be configured in _____different modes
three

Transistors can be configured in three different modes with one pair of terminals for the input and another pair for the output. These configurations are:
1. Common emitter
2. Common collector
3. Common base

In the _____configuration, the input terminal is the base while the output terminal is the collector and the emitter is common to both the input and the output
common emitter

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In the _____ configuration, the input terminal is the base while the output terminal is the emitter and the collector is common to both the input and the output
common collector

In the _____configuration, the input terminal is the emitter while the output terminal is the collector and the base is common to both the input and the output
common base
The _____ is a line drawn based on the DC operating characteristics of the circuit.
load line

_____ enables the visualization of the transistor characteristics.
Load line

_____ is determined by using the DC equations of the circuit.
Load line

The _____ is determined by identifying the two endpoints of the line.
load line

The load line is determined by identifying the _____ endpoints of the line.
Two

The load line is determined by identifying the _____ of the line.
two endpoints

The load line is determined by identifying the two _____ of the line.
endpoints

The _____can serve either as a switch or an amplifier.
transistor

The transistor can serve either as a _____ or an amplifier.
switch

The transistor can serve either as a switch or an_____.
amplifier

The transistor can serve either as a switch or an amplifier.
True

The mode of operation of each transistor is determined by the _____ in which it operates.
bias condition

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The mode of operation of each transistor is determined by_____
The bias condition in which it operates

_____ can be defined as the setting up of the DC voltages and current in an electronic circuit.
Biasing

Biasing can be defined as the setting up of the _____ voltages and current in an electronic circuit.
DC

Biasing can be defined as the setting up of the DC _____ and current in an electronic circuit.
voltages

Biasing can be defined as the setting up of the _____ and current in an electronic circuit.
DC voltages

Biasing can be defined as the setting up of the DC voltages and _____in an electronic circuit.
current

Biasing can be defined as the setting up of the DC voltages and current in an_____.
electronic circuit

Biasing can be defined as the setting up of the DC voltages and current in an electronic_____.
Circuit

Biasing can be defined as the setting up of the DC voltages and current in an _____circuit.
Electronic

From the output characteristics, the transistor has 3 regions of operation.
(i) Saturation region
(ii) Active region
(iii) Cutoff region

The transistor when operating as a switch is biased in the saturation or cutoff region but for the transistor to be used as an amplifier it is _____ in the active region.
biased

The transistor when operating as a switch is biased in the saturation or cutoff region but for the transistor to be used as an amplifier it is biased in the_____.
active region

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The _____ when operating as a switch is biased in the saturation or cutoff region but for the transistor to be used as an amplifier it is biased in the active region.
transistor

The transistor when operating as a _____ is biased in the saturation or cutoff region but for the transistor to be used as an amplifier it is biased in the active region.
Switch

The transistor when operating as a switch is biased in the _____or cutoff region but for the transistor to be used as an amplifier it is biased in the active region.
saturation

The transistor when operating as a switch is biased in the saturation or _____ but for the transistor to be used as an amplifier it is biased in the active region.
cutoff region

The determination of the _____ point is through the process of biasing
q

The determination of the q point is through the process of _____
biasing

Base Bias is the simplest type and is also known as_____.
fixed bias

The effect of the transistor gain on the collector current is reduced leading to _____
better system stability

The actual value of Ic is derived using the input equation since in most cases the VCE is _____
unknown

The base voltage is set by the resistors R1 and R2 thus the effect of the transistor forward gain is_____
reduced

Electronic amplifying devices such as BJT and FET have _____ terminals
Three

Electronic amplifying devices such as BJT and FET have three terminals (E,B,C and S,G,D).
True

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_____ for the BJT take advantage of the relative linearity of the base and collector curves in the vicinity of an operating point.
Small-signal models

The _____ are specifications used in the analysis of transistor amplifiers
Hybrid parameters

The _____parameters are specifications used in the analysis of transistor amplifiers
Hybrid

In order to fully analyze a _____ amplifier, the analysis is broken into AC and DC analysis.
transistor

In order to fully analyze a transistor_____, the analysis is broken into AC and DC analysis.
amplifier

In order to fully analyze a_____, the analysis is broken into AC and DC analysis.
transistor amplifier
In order to fully analyze a transistor amplifier, the analysis is broken into _____and DC analysis.
AC

In order to fully analyze a transistor amplifier, the analysis is broken into AC and _____analysis.
DC

In order to fully analyze a transistor amplifier, the analysis is broken into _____ and_____ analysis.
AC and DC

In the _____ analysis all capacitors are regarded as open circuits
DC

In the _____ analysis, the capacitors are regarded as short circuits and the DC source is replaced by a ground.
AC

The purpose of AC and DC analysis is_____
To determine the different specifications of the circuit

The purpose of the analysis is to determine the different specifications of the circuit. These specifications include the_____, output impedance and the circuit gain.

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input impedance

The purpose of the analysis is to determine the different specifications of the circuit. These specifications include the input impedance, _____ and circuit gain.
output impedance

The purpose of the analysis is to determine the different specifications of the circuit. These specifications include the input impedance, output impedance and_____.
circuit gain

The purpose of the analysis is to determine the different specifications of the circuit. These specifications include_____
input impedance, output impedance and circuit gain

Any amplifier circuit has the following parts:
1) The Bias Circuit
2) The Load Circuit
3) The Coupling Circuit

Before the _____ analysis is performed, all coupling capacitors are regarded as open circuit.
DC

Before the DC analysis is performed, all coupling _____ are regarded as open circuit.
capacitors

Before the DC analysis is performed, all _____ capacitors are regarded as open circuit.
coupling

Before the DC analysis is performed, all coupling capacitors are regarded as _____circuit.
open

Before the DC analysis is performed, all coupling capacitors are regarded as open_____.
circuit

Before the DC analysis is performed, all coupling capacitors are regarded as_____.
open circuit

Before the DC analysis is performed, all coupling capacitors are regarded as open circuit.
True

For the ac analysis the circuit is redrawn with the following assumptions.
1. All capacitors are short circuit
2. DC sources are replaced by ground

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The total _____ of the circuit is the parallel combination of R1 ,R2 and Rin(base).
input impedance

The total input impedance of the _____ is the parallel combination of R1 ,R2 and Rin(base).
circuit

The total input impedance of the circuit is the parallel combination of_____.
R1 ,R2 and Rin(base)

The total input impedance of the circuit is the _____combination of R1 ,R2 and Rin(base).
parallel

The total input _____ of the circuit is the parallel combination of R1 ,R2 and Rin(base).
Impedance

The total _____ impedance of the circuit is the parallel combination of R1 ,R2 and Rin(base).
Input

The _____ looking at the collector is approximately equal to RC.
output resistance

The output resistance looking at the collector is approximately equal to_____.
RC

The _____ is the ratio between the output voltage and the input voltage.
voltage gain

The voltage gain is the _____between the output voltage and the input voltage.
ratio

The voltage gain is the ratio between the _____and the input voltage.
output voltage

The voltage gain is the ratio between the output voltage and the_____.
input voltage

The voltage gain is the ratio between the_____.
output voltage and input voltage

The _____ is the voltage gain from the base to the collector of the transistor.
voltage gain

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The _____ is made up of the attenuation due to the source resistance and the base to collector
total circuit gain

The total circuit gain is made up of the _____ due to the source resistance and the base to collector
attenuation

The total circuit gain is made up of the attenuation due to the source _____ and the base to collector
resistance

The total circuit gain is made up of the attenuation due to the source resistance and the base to _____
collector

When a capacitor is connected across the emitter resistor it_____
bypasses the RE as the capacitor acts as a sort circuit for the AC signals

FETs behave as_____.
voltage-controlled resistors

There are _____ general classes of FETs
two

There are two general classes of FETs:_____ and_____
The Metal Oxide Semiconductor FET (MOSFET) and the Junction FET (JFET)

The _____ is similar to the BJT transistor in terms of the number of terminals and configuration.
FET

The FET has _____ terminals
Three

The _____is made up of a Semiconductor region known as the Channel with ohmic contacts at each end.
JFET

The JFET is made up of a _____region known as the Channel with ohmic contacts at each end.
Semiconductor

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The JFET is made up of a Semiconductor region known as the _____
Channel

The JFET is made up of a Semiconductor region known as the Channel with _____ at each end.
ohmic contacts

The JFET is made up of a Semiconductor region known as the Channel with _____contacts at each end.
ohmic

The _____ is always operated with the Gate to Source voltage in Reverse Bias
JFET

The JFET is always operated with the _____ to Source voltage in Reverse Bias
Gate

The JFET is always operated with the Gate to Source voltage in _____
Reverse Bias

The JFET is always operated with the Gate to Source voltage in _____ Bias
Reverse

Drain current at _____ is essentially zero.
Pinch-Off

_____ current at Pinch-Off is essentially zero.
Drain

Drain current at Pinch-Off is essentially_____.
zero

A _____ is a system in which the input signal is modified by the system output before the internal processing by the system itself
feedback system

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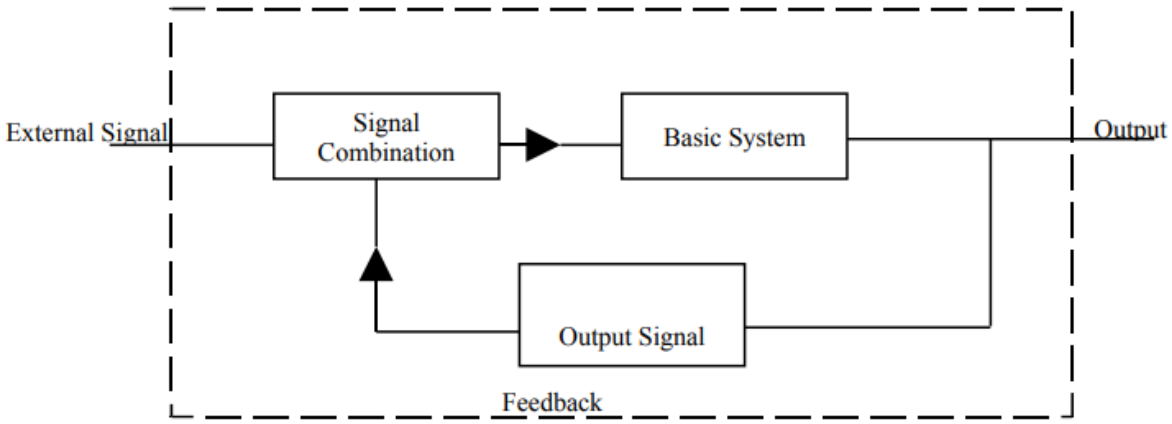


Figure 4.1: Typical Feedback system

A feedback amplifier consists of _____parts
two

A feedback amplifier consists of two parts:_____ and _____
Amplifier system and feedback system

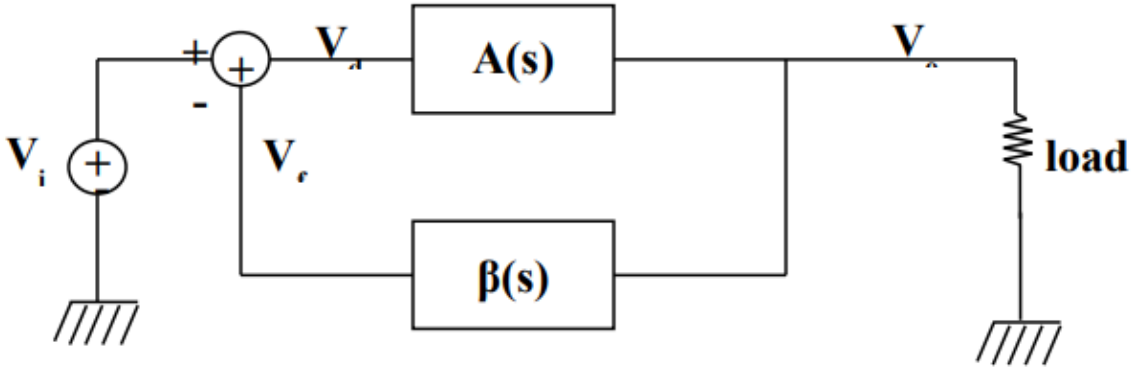


Figure 4.2: Classic feedback block system

In the _____ arrangement, the feedback voltage is in the same phase as the input voltage and it increases the input voltage amplitude.
positive feedback

In_____, the feedback voltage is 1800 out of phase with the input voltage.
negative feedback

In negative feedback, the feedback voltage is _____ out of phase with the input voltage.
180^0

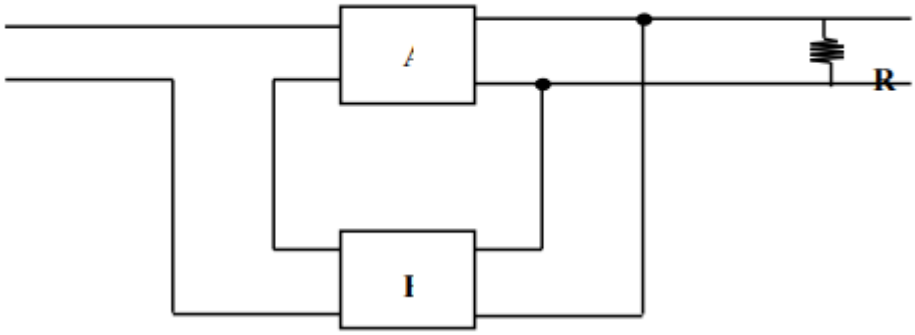
NFB stands for_____
Negative Feedback

PFB stands for_____
Positive Feedback

_____ helps to reduce the variation in gain to acceptable limits (or stabilize the gain).
Negative feedback

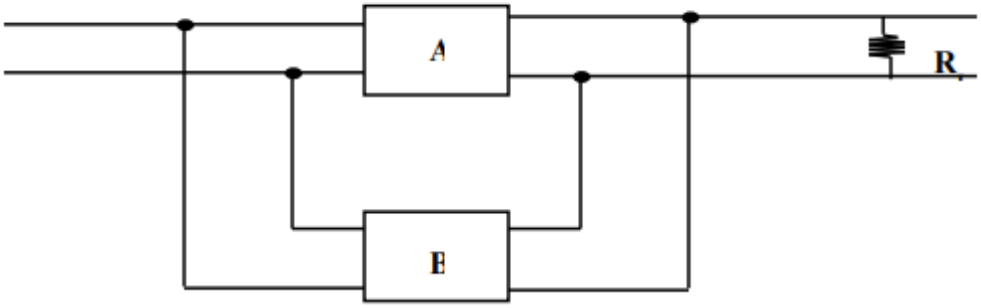
There are basically _____ types of feedback amplifier circuit topologies
4

Shunt Derived Series-Fed Feedback



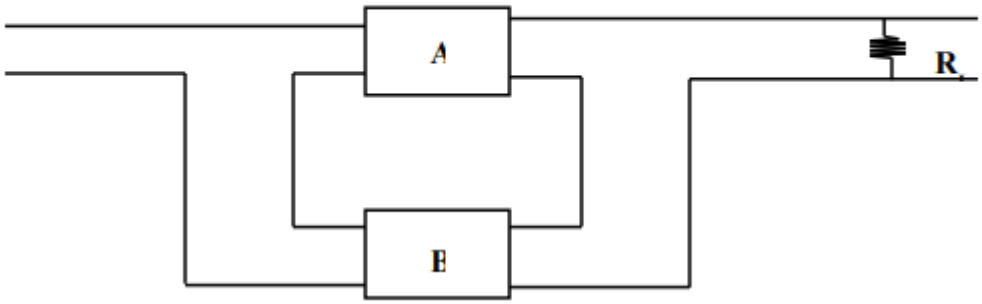
Shunt Derived Series-Fed Feedback is also known as_____.
Voltage Series Feedback

Shunt Derived Shunt-Fed Feedback Topology



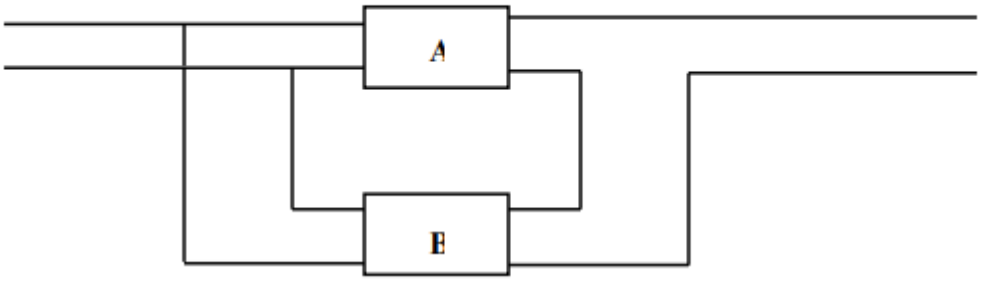
In _____ arrangement, the feedback is connected to both the input and output of the amplifier in parallel.
Shunt Derived Shunt-Fed Feedback Topology

Series Derived Series-Fed Feedback Topology



In _____ arrangement, the input and output of the amplifier are connected in series.
Series Derived Series-Fed Feedback Topology

Series Derived Shunt-Fed Feedback Topology



In_____ arrangement, the output is feedback in series and the input is connected in parallel.
Series Derived Shunt-Fed Feedback Topology

The application of negative feedback has the following summarized effects.
(i) Decreases the effect of noise
(ii) Decreases the voltage gain
(iii) Decreases the Harmonic distortion
(iv) Increases Gain stability
(v) Increases System bandwidth

The _____ parameters are derived to simplify circuit analysis.
Ideal Op Amp

Op amps depart from the ideal in _____ ways.
Two

The _____configuration has the input signal connected to its noninverting input.
noninverting op amp

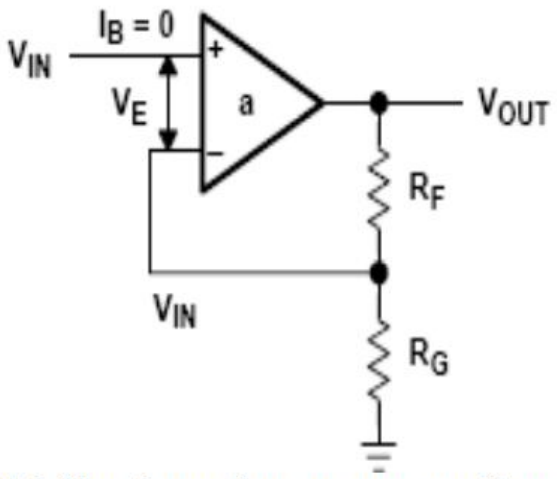


Figure 5.2 Non inverting opamp configurations

In the _____ configuration, the input is fed through the input resistor to the inverting pin and the noninverting input of the inverting op amp circuit is grounded.

Inverting

Using _____ law, and the Equation is written with a minus sign inserted because this is the inverting input.

Kirchoff's

Using Kirchoff's law, and the Equation is written with a _____sign inserted because this is the inverting input.

minus

Using Kirchoff's law, and the Equation is written with a minus sign inserted because_____

this is the inverting input

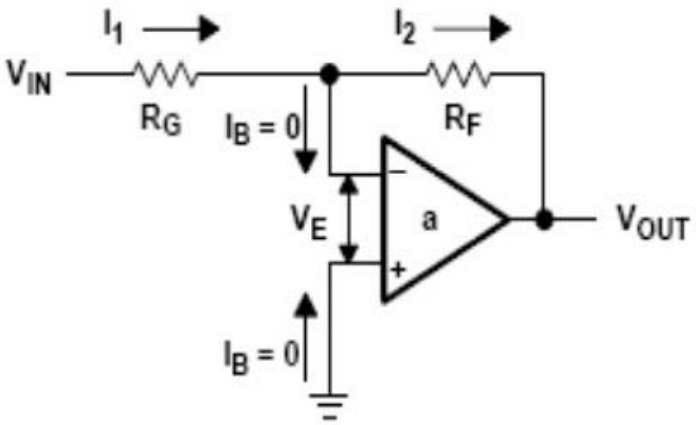


Figure 5.3 Inverting opamp configurations

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The function of the _____ is to produce an output proportional to the difference of the two input signals.
subtractor

_____ is a mathematical process of determining the area under a curve.
Integration

Integration is a _____ process of determining the area under a curve.
mathematical

Integration is a mathematical process of determining the area under a_____.
curve

The _____ produces an output that is proportional to the area under the curve of the input voltage.
Op amp integrator

The Op amp integrator produces an output that is _____ to the area under the curve of the input voltage.
proportional

The Op amp _____ produces an output that is proportional to the area under the curve of the input voltage.
integrator

The Op amp integrator produces an output that is proportional to the _____under the curve of the input voltage.
area

Integration is a mathematical process of determining the _____ under a curve.
area

The _____ is a low pass filter and produces more output for low frequency signals.
integrator

The integrator is a _____ filter and produces more output for low frequency signals.
low pass

The integrator is a low pass _____ and produces more output for low frequency signals.
filter

The integrator is a low pass filter and produces more output for _____ signals.
low frequency

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The integrator is a low pass filter and produces more output for _____ frequency signals.
low

The integrator is a low pass filter and produces more output for low _____signals.
frequency

The integrator is a low pass filter and produces more output for low frequency_____.
signals

The current through the _____ charges it in the direction
Capacitor

_____ is the process by which the rate of change of a curve at any given point can be determined. It is essentially the inverse of integration.
Differentiator

Differentiator is_____
the process by which the rate of change of a curve at any given point can be determined

Differentiator is the process by which the rate of change of a curve at any given point can be determined. It is essentially the _____of integration.
inverse

Differentiator is the process by which the rate of change of a curve at any given point can be determined. It is essentially the inverse of_____.
Integration

The most common source of dc power supplies are _____
batteries

The most common source of dc power supplies are batteries but they are faced with the following challenges:
• Limited life
• Reduction in terminal voltage over time
• Limited capacity

There are _____types of DC power supply
two

There are two types of DC power supply. These are:_____ and_____
unregulated power supply and regulated power supply

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_____ is a power supply whose terminal voltage is affected significantly by the amount of load.
Unregulated Power Supply

_____ DC power supply has a terminal voltage which remains constant regardless of the amount of current drawn from it.

A _____ power supply is achieved by the addition of a voltage regulating circuit to an unregulated DC power supply.
regulated

A _____ is achieved by the addition of a voltage regulating circuit to an unregulated DC power supply.
regulated power supply

Examples of voltage regulators are:
1. Zener diode voltage regulators
2. Transistor series voltage regulator
3. Integrated circuit voltage regulators both adjust able types and the fixed types. (e.g. 7805, 7808, e.t.c., LM 317, 117)

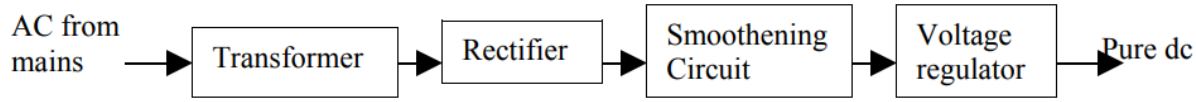


Fig 6.1: Components of a DC Power Supply

The _____ is responsible for stepping down the voltage level of incoming ac mains supply
transformer

There are basically _____ classes of transformers.
two

There are basically two classes of transformers. These are:_____ and _____
step-up transformer and step-down transformer

The _____ steps up the voltage from the ac mains
step-up transformer

The _____ is a reverse of the step-up transformer and its output voltage level is lower than the input voltage.
step-down transformer

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The dc power supply utilizes the _____ transformer.
step down

The dc power supply utilizes the step down_____.

The dc power supply utilizes the_____.
step down transformer

The purpose of the _____ is to convert the AC signal from the transformer to DC.
rectifier

The purpose of the rectifier is to convert the _____signal from the transformer to DC.
AC

The purpose of the rectifier is to convert the AC signal from the transformer to_____.
DC

The purpose of the rectifier is to convert the AC signal from the _____to DC.
transformer

There are two classes of rectifiers
Two

There are classes of rectifiers and these are:_____ and_____
half wave rectification and full wave rectification

The _____ of the ripple is the same as that of the input voltage.
frequency

The frequency of the _____ is the same as that of the input voltage.
ripple

The frequency of the ripple is the same as that of the _____voltage.
input

The frequency of the ripple is the same as that of the input_____.
voltage

The frequency of the ripple is the same as that of the input voltage.
True

The _____ rectifier converts the sinusoidal wave form with an average value of zero to a unidirectional wave form with a non zero average waveform.

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half wave

The half wave rectifier converts the sinusoidal wave form with an average value of zero to a _____ wave form with a non zero average waveform.
Unidirectional

The half wave rectifier converts the _____ wave form with an average value of zero to a unidirectional wave form with a non zero average waveform.
sinusoidal

The half wave rectifier converts the sinusoidal wave form with an average value of zero to a unidirectional wave form with a _____ average waveform.
non zero

The _____ is connected to indicate the average value of current passing through it.
DC ammeter

The DC _____ is connected to indicate the average value of current passing through it.
ammeter

The DC ammeter is connected to indicate the average value of _____passing through it.
Current

The DC ammeter is connected to indicate the _____ of current passing through it.
average value

Mathematically the average current Idc is an integration of the instantaneous current over the_____.
half cycle

The _____ reads the effective or rms value of the current passing through it.
AC meter

The _____ is given by the ratio of the output DC power to the total amount of input power supplied to the circuit.
efficiency of rectification

The _____of rectification is given by the ratio of the output DC power to the total amount of input power supplied to the circuit.
efficiency

The efficiency of rectification is also called the_____.
conversion efficiency

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_____ is the maximum voltage the diode has to withstand without failing when it is non conducting.
Peak Inverse Voltage

_____ is a measure of the AC components (fluctuating components) present in the rectifier output.
Ripple factor

_____ shows that the rms ripple exceeds the DC output voltage and thus the half wave rectifier is a poor rectifier circuit.
Ripple factor

_____ is the variation of DC output voltage as a result of variation of the DC load current.
Voltage regulation

_____ is the most frequently used rectifier circuit for electronic DC power supplies.
Full Wave Bridge Rectifier

Full Wave Bridge Rectifier requires _____ diodes but the center tapped transformer is not required.
four

Full Wave Bridge Rectifier comes in _____ distinct physical forms:
3

Full Wave Bridge Rectifier comes in 3 distinct physical forms:
1) Four discrete diodes
2) As a part of an array of diodes in an IC
3) One devices inside a four terminal case diagram

The easiest way to _____a circuit is by adding a capacitor in parallel to the resistive load.
smooth

The easiest way to smooth a circuit is by_____
adding a capacitor in parallel to the resistive load

The variation in the output voltage during charging and discharging is known as the_____.
ripple

_____ factor is an indication of effectiveness of the filter and it is defined as rms ripple voltage.
Ripple

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_____ is an indication of effectiveness of the filter and it is defined as rms ripple voltage.
Ripple factor

Ripple factor is_____
an indication of effectiveness of the filter and it is defined as rms ripple voltage

The average value of the voltage from the full wave rectifiers is twice that of the half wave.
True

A _____ is a circuit or device that provides a well specified, constant and stable DC voltage supply to other circuits.
voltage regulator

The _____ voltage is controlled by internal circuitry and is relatively independent of the current supplied by the regulator.
output

The _____is controlled by internal circuitry and is relatively independent of the current supplied by the regulator.
output voltage

The output voltage is controlled by internal circuitry and is relatively independent of the current supplied by the_____.
regulator

_____ are circuits incorporated into the unregulated DC power supply circuits and the ensure that the terminal voltage remains unchanged regardless of the variations in the input voltage provided the operational limits are not exceeded
Voltage regulators

There are DC power classified as either:
1. series regulators
2. shunt regulators
3. switching regulators

The basic diagram of a voltage regulator is consist of:
• A reference voltage circuit
• An error amplifier
• Current amplifier

Variations in the reference voltage can be caused by variations in the power supply voltage and this affects the output voltage. This parameter known as _____

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line regulation

_____ is defined as ratio of change in output to a given change in input supply voltage.
Line regulation

_____ is defined as the rate of change of output voltage with output current.
Output resistance

_____ is the change in output voltage between no load current condition and full load current condition, expressed in percentage.
Load regulation

_____ or maintain a constant dc voltage output by continuously adjusting the voltage drop across a power transistor connected in series between the unregulated input and the load.
Series regulators control

The _____ provides a scaled version of the input which is stabilized by the Zener diode.
Voltage reference

The _____ takes a scaled version of the output and compares it with the reference voltage and adjusts Vo via the series pass transistor.
Error amplifier

The aim of the error amplifier is to_____
drive the pass transistor in such a way that if the Vo is increasing, the transistor will reduce its amplification and if Vo is decreasing, the transistor will increase its amplification such that Vo is kept constant

The function of_____ is to boost the output current capabilities of the error amplifier.
Series pass element

_____ transfers large current to the load under the supervision and control of the error amplifier.
Series pass element

The performance of power transistors is affected by a number of factors such as

- Power dissipation capabilities
- Maximum voltage and current rating
- Maximum junction temperature

The performance of power transistors is affected by a number of factors such as Power dissipation capabilities, maximum voltage and current rating, maximum junction

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temperature; etc. This factor restricts the operation of the transistor to an area on the V & I curves known as the_____.
Safe Operating Area (SOA)

SOA means_____
Safe Operating Area

The _____ is defined as the area on the V and I curve within which the device can be operated without the risk of failure or degradation.
SOA

The purpose of _____circuit is to prevent the current through the series pass transistor from exceeding a predetermined value.
overload protection

The purpose of overload protection circuit is_____
to prevent the current through the series pass transistor from exceeding a predetermined value

The purpose of this circuit is to prevent the current through the series pass transistor from exceeding a predetermined value. This is also known as_____.
short circuit protection

_____ form of protection which is mostly used in high power regulators due to possibility of damage due to self heating is implemented by sensing the elements junction temperature and reducing the power dissipation until the temperature drops to a tolerable level.
Thermal Shut down

There are different types of IC voltage regulators. Some of these include:
(1) Three terminal Fixed Voltage Regulators e.g. μa7800 series (+), μA7900 series (-)
(2) There terminal adjustable Regulators e.g. LM 317 (+), LM 337 (-)
(3) Four terminal adjustable Regulators μA78G
(4) Dual Tracking Regulators
(5) Low Dropout Voltage Regulators.

_____ regulators come with 3 pins, one each for unregulated input, regulated output and ground.
Three Terminal Fixed Voltage Regulators

_____ types of regulators rely on external resistors to set the output voltage.
Three Terminal Adjustable Regulators

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A _____ is a metallic material attached to an integrated circuit chip or a high power dissipating transistor.
heat sink

The aim of heat sink is_____
to increase the total surface area of the component thereby increasing the rate of heat dissipation of the component

The purpose _____ is to ultimately prolong the life of the component.
heat sink

The purpose heat sink is_____
to ultimately prolong the life of the component

A heat sink is a _____ material attached to an integrated circuit chip or a high power dissipating transistor.
metallic

A heat sink is a metallic material attached to an _____ circuit chip or a high power dissipating transistor.
integrated

A heat sink is a metallic material attached to an integrated circuit chip or a high _____dissipating transistor.
power

A heat sink is a metallic material attached to an integrated circuit chip or a high power dissipating_____.
Transistor

The power dissipated in the transistor _____ its temperature above the ambient temperature.
increases

The power dissipated in the transistor increases its _____above the ambient temperature.
temperature

The power dissipated in the _____increases its temperature above the ambient temperature.
transistor

The power dissipated in the transistor increases its temperature above the _____temperature
ambient

The power dissipated in the transistor increases its temperature above the_____.

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ambient temperature

The maximum allowable chip temperature referred to as the _____ is given in data sheets.
maximum junction temperature

_____ is directly proportional to surface area so the larger the surface area of the chip, the faster the heat transfer from the chip.
Heat transfer

A _____ is a metal structure usually with fins that is bonded, clipped or clamped to the device package to facilitate heat flow from case to ambient.
heat sink

_____ improve the dissipation of a heat sink by a factor of two or three and this leads to smaller heat sink design.
Fans

_____ is the basic mathematics for the study of logic design
Boolean algebra

Basic laws of Boolean algebra are implemented as switching devices called_____.
logic gates

A Boolean variable can take on two values '0' and '1', 'T', 'F or H,L or ON,OFF.

Boolean operations transform Boolean Variables the basic operations are _____
NOT, AND, OR

_____ Theorem allows gates to be converted to others by simply inverting the inputs of the selected gate.
DeMorgan's

_____ allows gates to be converted to others by simply inverting the inputs of the selected gate.
DeMorgan's Theorem

More specifically, you can convert gates to others if the following steps are followed accordingly:
1. Complement all inputs.
2. Convert all AND operations to ORs
3. Convert all OR operations to ANDs
4. Complement the entire expression

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A _____ is an electronic circuit which makes logic decisions.
logic gate

_____ are the fundamental blocks with which digital systems are built.
Logic gate

The output is a result of the implementation of the logical algebra known as the_____.
Boolean algebra

One characteristic of this Boolean algebra is that_____
the variables can only assume one of the two values 0 and 1

The gates are available in various IC families, popular among them are

- the transistor- transistor logic (TTL)
- emitter coupled logic (ECL)
- metal oxide semiconductor (MOS)
- complementary metal oxide semiconductor (CMOS)

TTL means_____
The Transistor- Transistor Logic

ECL means_____
Emitter Coupled Logic

MOS means_____
Metal Oxide Semiconductor

CMOS means_____
Complementary Metal Oxide Semiconductor

The _____ is a gate which produces a high output of any or both (all) if its inputs are high.
OR gate

OR gate can also be known as an _____
inclusive OR gate

The _____ is a logic gate which will give a high output if and only if all its inputs are high.
AND gate

The NOT gate is also known as an _____
inverter

The NOT gate is also known as an inverter because_____

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it inverts the input signal

The NOT gate to produce other gates known as the _____and_____ gates.
NOR and NAND

The NOR gate is also referred to as a _____
universal gate

The NOR gate is also referred to as a universal gate because_____
it can be used to simulate OR, AND and NOT gate functions

By placing another inverter at the output of the NOR gate the output is re-inverted giving an_____.
OR gate function

Exclusive-NOR gate is otherwise known as the _____
XNOR

A map, describing all possible combinations of the variables present in the logic function of interest is called a _____
Karnaugh map

The _____ consists of row and column assignments for two or more variables arranged so that all adjacent terms change by only one bit.
karnaugh map

_____ are a graphical way of simplifying a Boolean expression and thus simplifying the resulting circuit.
Karnaugh maps

A _____ is a completely mechanical method of performing this simplification, and so has an advantage over manipulation of expressions using Boolean algebra.
Karnaugh map

_____ are effective for expressions of up to about six variables.
Karnaugh maps

The _____ uses a rectangle divided into rows and columns in such a way that any product term in the expression to be simplified can be represented as the intersection of a row and a column.
Karnaugh map

The major advantage of Karnaugh maps is_____

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its ability to simplify logic design by simplifying the Boolean expression and/or truth table and eliminating unnecessary logic gates in a digital logic design

The _____ generates an expression with three product terms
truth table

The truth table generates an expression with _____ product terms
Three

The two components of a_____ amplifier are amplifier system and the feedback system
feedback

There are_____ basic types of feedback arrangements
Two

The feedback ration β is often determined by the ratio of two_____
resistors

The Ideal_____ parameters are derived to simplify circuit analysis
Op Amp

The two basic configurations of the operational amplifier are the noninverting op amp configuration and the inverting_____ Op Amp
Inverting

The _____ parameters are specifications used in the analysis of transistor amplifiers
Hybrid

The transistor can serve either as a_____ or an amplifier
switch

_____ can be defined as the setting up of the DC voltages and current in an electronic circuit
Biasing

Integration is a mathematical process of determining the area under a_____
curve

The adder circuit of the operational amplifier provides an output voltage proportional to the algebraic sum of the inputs, each multiplied by a_____ gain factor
constant

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_____ is the process by which the rate of change of a curve at any given point can be determined
Differentiator

The differentiator is basically a high pass_____
filter

There are two types of _____ power supply namely unregulated Power Supply and Regulated Power Supply
DC

The_____ is responsible for stepping down the voltage level of incoming AC mains supply
transformer

_____ Power Supply is a power supply whose terminal voltage is affected significantly by the amount of load. As the load draws more current the DC terminal voltage becomes less
Unregulated

The_____ transformer steps up the voltage from the ac mains
step-up

The_____ power supply utilizes the step down transformer
DC

The purpose of the rectifier is to convert the AC signal from the_____ to DC
transformer

There are two classes of rectifiers namely the half wave rectification and the_____ wave rectification
full

The_____ of rectification is given by the ratio of the output DC power to the total amount of input power supplied to the circuit
efficiency

Efficiency of Rectifiers is also called the_____ efficiency
conversion

In the_____ feedback arrangement, the feedback voltage is in the same phase as the input voltage and it increases the input voltage amplitude
positive

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The_____ is a direct coupled amplifier capable of amplifying signals from DC up to a few MHz
operational amplifier

_____ voltage is the maximum voltage the diode has to withstand without failing when it is not conducting
Peak inverse

The measure of the AC components present in the rectifier output is known as _____factor
Ripple

Biasing can be defined as the setting up of the DC voltages and current in an_____ circuit
electronic

Load_____ is the change in output voltage between no load current condition and full load current condition, expressed in percentage
Regulation

A_____ is a metal structure usually with fins that is bonded, clipped or clamped to the device package to facilitate heat flow from case to ambient
heat sink

The load lines enables the_____ of the transistor characteristics
visualization

The equation (A + B) + C = A + (B + C) represents_____ laws of Boolean algebra
Associative

The equation A (B + C) = A B + A C represents_____ laws of Boolean algebra
Distributive

The equation A (A + B) = A represents_____ laws of Boolean algebra
Redundance

The ratio of change in output to a given change in input supply voltage is regarded as_____ regulation
line

_____ factor is the ratio of the rms value of AC components of the output to the DC value of the load voltage
ripple

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Peak Inverse Voltage is the maximum voltage the_____ has to withstand without failing when it is non conducting
diode

The ratio of the output DC power to the overall amount of input power supplied to a circuit is regarded as the_____ of rectification.
efficiency of rectification

The_____ is responsible for stepping down the voltage level of incoming ac mains supply
transformer

Differentiator I s the process by which the rate of change of a_____ at any given point can be determined
curve

Voltage Series Fed Feedback is also referred to as_____ derived series- feedback
Shunt

Typical_____ are subject to changes such as temperature, DC supply levels and ageing
amplifiers

Feedback_____ is made up of Amplifier system and the feedback system
amplifier

OR gate is otherwise regarded as_____ OR
inclusive

Coupling Circuit, the Load Circuit and the Bias are components parts of an_____ circuit
amplifier

The total input impedance of the circuit is the_____ combination of R1 ,R2 and Rin (base)
parallel

Voltage_____ refers to the ratio between the output voltage and the input voltage
gain

Professionally speaking, Junction FET is commonly abbreviated as_____
JFET

There are two basic types of_____ arrangements namely positive and negative feedback
feedback

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There are basically_____ types of feedback amplifier circuit topologies depending on how the signals are added at the input
four

Shunt Derived Series-Fed Feedback is also known as _____ series feedback
Voltage

The Ideal Op Amp parameters are derived to simplify_____ analysis
circuit

The rate of loss of heat is proportional to the temperature difference between the_____ and the ambient
Junction

Basic laws of Boolean algebra are implemented as switching devices called_____
logic gates

DeMorgan's Theorem allows gates to be converted to others by simply_____
Inverting the inputs of the selected gate

The following gates are used to convert gates to others except
Convert all NOR operations to ANDs

The Inclusive OR is otherwise called_____
OR gate

_____is a table which gives the output state for all the possible input combination
Truth table

If Input A = 0 and Input B = 1, from the truth table, what is the value of the output C in an OR gate?
1

If Input A = 1 and Input B = 1, from the truth table, what is the value of the output C in an OR gate?
1

The AND gate can also be realized using the_____ and the transistor.
diode

If Input A = 1 and Input B = 1, from the truth table, what is the value of the output C in an AND gate?
1

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If Input A = 1, Input B = 1 and Input C = 0 from the truth table, what is the value of the output D in an AND gate?
0

If Input A = 1, Input B = 1 from the truth table, what is the value of the output C in a NOR gate?
0

If Input A = 1, Input B = 0 from the truth table, what is the value of the output C in a NOR gate?
0

The NAND gate is also a universal gate as it can be constructed to get either an …. or an OR gate operation.
AND gate

If Input A = 1, Input B = 0 from the truth table, what is the value of the output C in a NAND gate?
1

If Input A = 0, Input B = 1 from the truth table, what is the value of the output C in a NAND gate?
0

If Input A = 0, Input B = 0 from the truth table, what is the value of the output C in a NAND gate?
1

The ratio of the rms value of AC components to the DC value of load voltage is referred to as the _____
Rectification factor

In the Series Derived Shunt-Fed Feedback Topology the input is connected in _____
parallel

Zener diode can be applied in the following application areas except
Voltage converter

In _____ , the transistor operates somewhere between saturation and cut-off state
Linear regulator

A major disadvantage of the _____ pass transistor regulator is that they are inefficient

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series

The positive feedback current is used mainly in_____
oscillators

In the voltage divider bias, the DC bias Voltage and Current are _____
Dependent on temperature

The OP AMP differentiator is basically a _____ pass filter
high

Using a truth table, the expression A + A'B can be shown to be _____
A + B

In the half wave rectifier, the output ripple frequency is _____
Twice the input frequency

Which of the following is true about BJT transistors?
BJTs are current controlled devices

Any amplifier circuit has the following parts EXCEPT
The Electric Circuit

Given IDSS = 12mA, VGS (off) = -5V, determine the value of ID at VGS = 0, -1, -4
0.48mA

A digital signal 101011 is applied to a NOT gate. what will be the NOT gate output
010100

In the common emitter configuration the output is gotten from the _____
Collector

_____ is the limitations of batteries as the commonest source of AC supply
Availability

The following are examples of voltage regulators except
Zener diode voltage transformers

The following are components of DC power supply except
Inverter

There are DC power classified as either; series regulators shunt regulators or_____
switching regulators

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Voltage regulators ensure that the terminal voltage remains unchanged regardless of the_____ in the input voltage provided the operational limits are not exceeded
variations

Ripple factor is a measure of the_____ (fluctuating components) present in the rectifier output
AC components

The following are examples of voltage regulators except _____
Transformer diode

The operational amplifier is a direct coupled amplifier capable of_____ signals from DC up to a few MHz
Amplifying

The total input impedance of the circuit is the_____ combination of R1 ,R2 and Rin(base).
pararell

The_____ is a low pass filter and produces more output for low frequency signals
calculator

Amplifiers have a frequency range over which the gain and phase shift are approximately _____
constant

The_____ parameters are derived to simplify circuit analysis
Ideal Op Amp

The _____ configuration has the input signal connected to its non-inverting input
Non-inverting op amp

The_____ gate is also known as an inverter
NAND

The_____ gate is also referred to as a universal gate
NOR

If a digital signal 101011 is applied to a NOT gate what will be the NOT gate output?
010100

Any amplifier circuit has the following parts except_____
DC Analysis

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The efficiency of rectification is given by the ratio of the output DC power to the total amount of ____ power supplied to the circuit
Input

The differentiator is basically a _____-pass filter
High

Normally, bipolar _____ transistors behave as current-controlled devices.
Junction

Field-effect transistors act as a _____-controlled device.
Voltage

Consider the block diagram of the pnp transistor shown above, the part labelled 'X' is called_____
Collector

Consider the block diagram of the pnp transistor shown above, the part labelled 'Y' is called _____.
Base

Consider the block diagram of the pnp transistor shown above, the part labelled 'Z' is called?_____
Emitter

Generally, the line drawn based on the direct current operating characteristics of the circuit is referred to as a _____ line
Load

When identifying the endpoints of a load line, IC(max) is calculated by assuming that VCE is equal to _____.
Zero

The voltage _____ is the ratio between the output voltage and the input voltage
Gain

The _____ is responsible for stepping down the voltage level of incoming AC mains supply
Transformer

The _____ current power supply utilizes the step down transformer
Direct

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The JFET is always operated with the Gate to Source voltage in _____ bias.
Reverse

In the common collect configuration of a BJT, the input terminal is the base while the output terminal is the_____ and the collector is common to both the input and the output.
Emitter

The ____ gate is also referred to as a universal gate, because it can be used to simulate the functions of 'OR', 'AND' and 'NOT' gates.
NOR

A DC power supply whose terminal voltage remains constant regardless of the amount of current drawn from it is known as a _____ power supply.
Regulated

_____ factor is the ratio of the rms value of AC components of the output to the DC value of the load voltage
Ripple

The _____ gate can also be realized using the diode and the transistor
AND

In Boolean algebra, $A + (B \cdot C) = (A + B)(A + C)$ is an example of _____ law.
Distributive

In a DC power supply, a _____ converts the AC signal to DC.
Rectifier

A Junction Field Effect Transistor has three terminals namely: source, drain and_____
Gate

_____ inverse voltage is the maximum voltage the diode has to withstand without failing when it is non-conducting.
Peak

In the common emitter configuration, the input terminal is the base while the output terminal is the _____ and the emitter is common to both the input and the output.
Collector

In the DC analysis of transistors amplifiers, all capacitors are regarded as _____ circuits.
Open

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In a DC power supply, the easiest way to smooth a circuit is by adding a _____ in parallel to the resistive load.
Capacitor

_____ regulation is defined as ratio of change in output to a given change in input supply voltage of a voltage regulator circuit.
Line

_____ regulation is the change in output voltage between no load current condition and full load current condition, expressed as a percentage.
Load

_____ regulators control or maintain a constant DC voltage output by continuously adjusting the voltage drop across a power transistor connected between the unregulated input and the load.
Series

_____ protection circuits prevent the current through the series pass transistor from exceeding a predetermined value.
Overload

The measure of the AC components present in the rectifier output is known as _____ factor.
Ripple

The load lines enables the visualization of the _____ characteristics
Transistor

Basic laws of Boolean algebra are implemented as switching devices called _____ gates
Logic

A heat _____ is a metallic material attached to an integrated circuit chip or a high power dissipating transistor to increase the total surface area from which heat can dissipate.
Sink

In the laws of Boolean algebra, (A + B) = (B + A) is an example of _____ law
Commutative

In Boolean algebra, (A + B) + C = A + (B + C) is an example of _____ law.
Associative

For the logic gate shown above, if the inputs A = 1 and B = 1, the output Q is equal to _____. (numeric answer only)

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0

For the logic gate shown above, if the input A = 0 and B = 1, the output Q is equal to _____. (numeric answer only)
1

For the logic gate shown above, if the input A = 0 and B = 0, the output Q is equal to _____. (numeric answer only)
1

For the logic gate shown above, if the input A = 1 and B = 1, the output Q is equal to _____. (numeric answer only)
1

For the logic gate shown above, if the input A = 0 and B = 0, the output Q is equal to _____. (numeric answer only)
1

For the logic gate shown above, if the input A = 0 and B = 1, the output Q is equal to _____. (numeric answer only)
0

A digital signal 101011 is applied to a NOT gate. The output is equal to _____.
010100

Consider the truth table shown above, the value of Q is equal to _____.
1

The _____ gate is a logic gate which will give a high output if and only if all its inputs are high.
AND

_____ map is used for simplifying logic design by describing all possible combinations of **the variables present in the logic function of interest**
Karnaugh

Line _____ is defined as ratio of change in output to a given change in input supply voltage.
Regulation

The _____ operating area' is defined as the area on the V and I curve within which the device can be operated without the risk of failure or degradation.
Safe

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The transistor when operating as a switch is biased in the saturation or cutoff region but for the transistor to be used as an amplifier, it is biased in the _____ region.
Active

For a _____ feedback system, the feedback voltage is 180o out of phase with the input voltage.
Negative

The _____ feedback arrangement is often unstable and is mostly used in the design of oscillators.
Positive

The _____ is NOT a Bipolar Junction Transistor configuration.
Common output

The transistor is a three-terminal semiconductor device which can be used for _____ and switching
Routing

The base-emitter (BE) junction of a Bipolar Junction Transistor (BJT) acts like a diode when it is _____-biased
Forward

Why is the common emitter (CE) configuration preferred for amplifiers in circuit design?
The input impedance of the CE configuration is higher than that of the CC

The load line is a line drawn based on the _____ operating characteristics of the circuit.
Direct current

_____ can be defined as the setting up of the DC voltages and current in an electronic circuit
Biasing

Which of the following options is NOT normally found in an amplifier circuit?
The Current Circuit

Which of the following options is used to calculate the voltage gain?
Output voltage / Input voltage

_____ is NOT true about the positive feedback arrangement of a feedback amplifier?
The feedback voltage is 180 O out of phase with the input voltage

The ratio of the rms value of AC components to the DC value of load voltage is referred to as the _____

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Rectification Factor

In the Series Derived Shunt-Fed Feedback Topology, the input is connected in _____
Parallel

Zener diode can be applied in the following application areas except _____
Voltage Converter

In _____, the transistor operates somewhere between saturation and cut-off state
Linear Regulator

An _____ amplifier can perform operations such as addition, subtraction, differentiation or integration
Operational

The OR gate is a Boolean mathematical equivalence of _____
Addition

The positive feedback current is used mainly in_____
Oscillators

The OP AMP differentiator is basically a_____ pass filter
High

In the half wave rectifier, the output ripple frequency is _____
Twice the input frequency

Any amplifier circuit has the following parts except _____
The Electric Circuit

A digital signal 101010 is applied to a NOT gate. What will be the output?
010101

In the common emitter configuration, the output is derived from the _____
Collector

Which configurations of the bipolar junction transistor (BJT) has the lowest gain?
Common Base

_____ is NOT a stage in the conversion of AC to a DC power supply.
Thermistor

What is the output terminal of the common collector configuration of a BJT?

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Emitter

Which logic gate is also known as an inverter?
NOT

Which logic gate is also known as a universal gate?
NOR

What is the output of a 'NOT gate' when the digital signal 110101 is applied to its input?
0 0 1 0 1 0

In free air operation, the thermal resistance consists of ____ and thermal resistance from core to ambient
thermal resistance from junction to case

In Boolean algebra, _____ is a table which gives the output state for all the possible input combination
Truth table

Which of the following basic Boolean algebraic identities is NOT correct?
A · 0 = 1

In the Series Derived Shunt-Fed Feedback Topology, the input is connected in _____
Parallel

In _____ , the transistor operates somewhere between saturation and cut-off state
Linear Regulator

In voltage divider bias, the DC bias Voltage and Current are _____
Dependent on temperature

Which option is the output terminal of the common emitter configuration of a BJT?
Collector

The following are components of DC power supply except _____
Inverter

Which equation correctly represents the flow of electrons in an npn transistor?
IE = IB + IC

Which of the following configurations would you use to reduce the effect of the transistor gain on the collector current (IC) to improve system stability?
Base Bias with Collector Feedback

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Which Transistor Hybrid parameter is approximately equal to the ratio Δ VBE/ Δ IB and the forward resistance of the BE junction?
hie

Which of the transistor hybrid parameter is calculated using the formula Δ IC / Δ VCE?
hoe

The current ratio Δ IC / Δ IB is used to calculate which transistor hybrid parameter?
hfe

Which of the following Boolean algebraic identities is NOT equal to A?
A + 1

In Boolean algebra, which of the following options is an example of distributive law?
A (B + C) = A · B + A · C

Which of the following options is a simplification of the Boolean expression: A · B + A · B-
A

Consider the logic gates shown above, which of the following options is equivalent to the output Q?
A · B

Consider the logic gates shown above, which of the following options is equivalent to the output Q?
A · B

Consider the logic gate shown above, what is the output 'Q' if two signals A = 0110 and B = 0011 are fed to the input.
Q = 1 1 0 1

Which of the following options is NOT true about the common base configuration of a Bipolar Junction Transistor?
Preferred choice for current amplification

Which of the following materials is often used for the construction of heat sinks due to its light weight and low resistivity?
Aluminium

Using Boolean algebra, ___ expression is equivalent to:
A (B + C)

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Which of the following expressions is equivalent to (A + B) · (A + C) after simplifying using Boolean algebra ?
A + (B · C)

When VGS becomes more negative to a point where ID=0, the_____ known as pinch-off arises
conduction

In a P channel JFET, the_____ junctions are reversed from those of the N Channel
P and N

The JFET is always operated with the_____ to Source voltage in Reverse Bias
Gate

The FET is similar to the _____ transistor in terms of the number of terminals and configuration
BJT

The JFET is made up of a_____ region known as the Channel with ohmic contacts at each end
Semiconductor

When a capacitor is connected across the emitter resistor it_____ the RE as the capacitor acts as a sort circuit for the AC signals
bypasses

Rin (base) is the resistance at the base of the transistor and it is derived with the ac_____ added in series to the RE
emitter resistance

A transistor is a three-terminal semiconductor device that can be used for amplification and _____
switching

Before the DC analysis is performed, all_____ capacitors are regarded as open circuit
coupling

We first write the collector circuit equation by applying_____
KVL

The final stage of program development is_____
Documentation

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The process for writing the program is called_____
Coding

The clear statement of the problem is stated at what stage of the system development life cycle?
Analysis

There are_____ levels of the programming language
Four

The maximum allowable chip temperature is known as the _____temperature
maximum chip

The logic gate which will give a high output if and only if all its inputs are low is_____ gate
NAND

In the half wave rectifier, the output ripple frequency is _____
Twice the input frequency

A graph consists of_____ things
Two

An_____ is a finite sequence of unambiguous instructions detector or a sensor
algorithm

The normal program execution consists of_____ stages
four

In the common emitter configuration the output is gotten from the _____
Collector

In The three configurations of the bipolar junction transistor, the configuration with the lowest gain is common_____
Base

A transistor is a three-terminal semiconductor device that can be used for amplification and_____
switching

The JFET is made up of a_____ region known as the Channel with ohmic contacts at each end
Semiconductor

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In a P channel JFET, the_____ junctions are reversed from those of the N Channel
P and N

When VGS becomes more negative to a point where ID=0, the known as pinch-off arises
conduction

The JFET is always operated with the_____ to Source voltage in Reverse Bias
Gate

Rin (base) is the resistance at the base of the transistor and it is derived with the ac_____ added in series to the RE
emitter resistance

Before the DC analysis is performed, all_____ capacitors are regarded as open circuit
coupling

The FET is similar to the_____ transistor in terms of the number of terminals and configuration
BJT

When a capacitor is connected across the emitter resistor it_____
the RE as the capacitor acts as a sort circuit for the AC signals bypasses

We first write the collector circuit equation by applying_____
KVL

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