TWO MARKS (5 Units)

1. Define an integrated circuit. (or) what is an integrated circuit? [May 2010]

An integrated circuit (IC) is a miniature, low cost electronic circuit consisting of active and passive components fabricated together on a single crystal of silicon. The active components are transistors and diodes and passive components are resistors and capacitors.

2. Mention the advantages of integrated circuits.

The advantages of integrated circuits are,

Miniaturization and hence increased equipment density.

Cost reduction due to batch processing.

Increased system reliability due to the elimination of soldered joints.

Improved functional performance.

Matched devices.

Increased operating speeds. Reduction in power consumption

3. Define Current mirror circuit & List out its advantages. (or) What is current mirror? [April/May 2010, Nov/Dec 2011]

A circuit in which the output current is equal to input current is called current mirror circuit. In current mirror circuit, the output current is the mirror image of the input current.

Advantages:

a. High CMRR

b. Easy to design

4. Draw the current mirror circuit.

5. Give the basic concept of current source.

A constant current source makes use of the fact that for a transistor in the active mode of operation, the collector current is relatively independent of collector voltage.

6. What are the applications of current sources?

The applications of current sources are:

i. The emitter resistance in differential amplifier to increase CMRR.

ii. As an active load to provide high a.c.resistance without disturbing the d.c conditions.

7. Give the limitation of current mirror circuit.

The limitation of current mirror circuit is whenever we need low value of current, the value of resistance is high and it cannot be fabricated economically in IC circuits

8. Justify the reasons for using current sources in integrated circuits.

1. Superior insensitivity of circuit performance to power supply variations and temperature.

2. More economical than resistors in terms of die area required providing bias currents of small value.

3. When used as load element, the high incremental resistance of current source results in high voltage gains at low supply voltages.

9. What is the advantage of widlar current source over constant current source?

Using constant current source, the output current of small magnitude (microamp range) is not attainable due to the limitations in chip area. Widlar current source is useful for obtaining small output currents. Sensitivity of widlar current source is less compared to constant current source.

10. Mention the advantages of Wilson current source.

The advantages of Wilson current sources are:

Provides high output resistance.

Offers low sensitivity to transistor base currents.

11. What is voltage source?

A voltage source is a circuit that produces an output voltage (V0), which is independent of the load
driven by the voltage source or the output current supplied to the load.

12. Give advantages of emitter follower voltage source.

The advantages of emitter follower are:

a. It produces low ac impedance

b. Gives effective decoupling of adjacent gain stages.

13. Write the limitation of emitter follower or common collector voltage source.

Emitter follower voltage source is weak and without protection for changes in bias voltage and the
output voltage with respect to changes in supply voltage.

14. What is voltage reference? [Nov/Dec 2021]

The circuit that is designed for providing a constant voltage independent of changes in temperature
is called a voltage references.

15. Define temperature coefficient.

Temperature coefficient is the measure of the ability of the circuit to maintain the standard output
voltage under varying temperature conditions.

TC(Vo) = dVo/ dT in mV/o C

16. What are the properties of voltage reference?

The Properties of voltage reference are:

i. Reference voltage must be independent any temperature change.

ii. It must have good power supply rejection which is independent of the supply voltage.

iii. The circuit should have low output impedance.

17. What are the parameters of voltage reference circuits?

The Parameters of voltage reference are:

i. Line regulation

ii. Load regulation

iii. Long term stability

iv. Ripple rejection ratio.

18. Define line regulation.

Line regulation is defined as the ratio of change in output voltage to the change in input voltage.

Line regulation = $\Delta Vo/\Delta Vi$

Where ΔVo – changes in the output line voltage

ΔVi - changes in the input line voltage It is expressed in mV/V

19. Define load regulation.

Load regulation is defined as the ratio of change in output voltage to the change in load current. Load
regulation = $\Delta Vo/\Delta IL$

Where ΔVo – changes in the output line voltage

ΔIL - changes in the load current It is expressed in mV/mA

20. What is long term stability?

The ability of the circuit to maintain the output voltage constant with respect to time is given by
the parameter long term stability. It is measured in ppm/1000 hours.

21. Define Ripple Rejection Ratio (RRR).

The ability of the circuit to reject input ripples and an indication of how much ripples are present at

the output due to input is given by the factor RRR.It is defined as RRR = 20 log10[Vri/Vro]
Where Vri - Input ripple and Vro –Output ripple

22. What are the limitations in a temperature compensated zener-reference source?

Limitations of zero reference source:

A power supply voltage of at least 7 to 10 V is required to place the diode in the breakdown region
and that substantial noise is introduced in the circuit by the avalanching diode.

23. What is differential amplifier?

A circuit which amplifies the difference between two input voltage signals. Hence it is also called
as difference amplifier.

24. Draw the block diagram for differential amplifier.

25. What are the properties of differential amplifier?

The Properties of differential amplifier are:

i. Excellent stability
ii. High versatility
iii. High immunity to interference signals.

26. Give the advantages of differential amplifier.

The advantages of differential amplifier are:

1. Lower cost
2. IC fabrication is easy
3. Closely matched components

27. Define differential gain.

Differential gain is defined as the ratio of the output voltage to the difference voltage.

Ad = Vo /Vd ,

In decibel 20 log10 Ad = 20 log10Vo /Vd

28. Why are active loads preferred than passive loads in the input stage of an operational amplifier?

[Nov /Dec 2010]

Differential amplifier designed with active load to increase the CMRR. The gain increased
by using large value of collector resistances. If the collector resistance is large then limitation in IC
fabrications are large chip area and large bias voltage need.

29. Define CMRR. [May/June 2004, Nov/Dec 2005, Nov/Dec 2009, Nov/Dec 2010]

The common Mode Rejection ratio (CMRR) is defined as the ration of difference modegain to the
common mode gain

CMRR = |ADM/ACM|

It is expressed in decibel (dB)

30. What are the draw backs of using large RC in differential amplifier?

The main draw backs are: It requires large chip area. For larger RC quiescent drop, a large power
supply will be required to maintain a given quiescent collector current.

31. What is active load? Where it is used and why?

The requirement to increase the gain is same that the collector resistance (RC) should not disturb d.c
Conditions while it must provide large resistance for a.c purposes. The current mirror which has very low d.c resistance (dV/dI) and higher a.c resistance (dv/di) can be used as a collector load instead of RC. Such a load is called as active load.

32. What is an operational amplifier? [Nov/Dec 2005]

An operational amplifier is a direct-coupled, high gain amplifier consisting of one or more differential
amplifier. By properly selecting the external components, it can be used to perform a variety of mathematical operations.

33. What are the popular IC packages available?

The IC packages available are:

——————————— Metal can package.
——————————— Dual-in-line package.
——————————— Ceramic flat package.

34. List out the ideal characteristics, and draw the equivalent diagram of an OP-AMP Mention any four
important characteristics of ideal operational amplifier. [May/June2003, May/June2009, Nov/Dec2010]

The Ideal characteristics of op-amp are:

——————————— Open loop voltage gain is infinity.
——————————— Input impedance is infinity.
——————————— Output impedance is zero.
——————————— Bandwidth is infinity.
——————————— Zero offset
——————————— Infinite CMRR
——————————— Infinite slew rate
——————————— PSRR = 0

35. Draw the circuit symbol for op-amp.

36. Define Virtual ground property of an OP-AMP.

A virtual ground is a ground which acts like a ground. It may not have physical connection to ground.

This property of an ideal op-amp indicates that the inverting and non-inverting terminals of op-amp are at the same potentials. The non-inverting input is grounded for the inverting amplifier circuit. This means that the inverting input of the op-amp is also at ground potential.

37. Draw the equivalent diagram of an OP-AMP. (May 2018)

38. What are the stages in op-amp?

The stages of op-amp are:

a. Input stage
b. Gain stage
c. Output stage

39. What are the requirements of the input stage of an op-amp?[May/June 2010]

The differential amplifier eliminates the need for an emitter bye-pass capacitor. So, differential amplifier is used as an input stage in op-amp ICs

40. In what way 741S is better than 741? [Nov/Dec2003]

741S is a military grade op-amp with higher slew rate

41. Why is IC741 op-amp not used for high frequency applications?

Op-amp IC741 has very low slew rate and therefore cannot be used for high frequency applications

42. Define Input bias current. [May/June 2009]

Input bias current IB is the average of the currents that flow into the inverting and non-inverting
input terminals of the op-amp.

i.e. IB = (IB1+IB2)/2

43. Define Input offset current. [May/June 2009]

The algebraic difference between the current into the inverting and non-inverting terminals is

referred to as input offset current Iio. Mathematically it is represented as Iios= |IB+ - IB- |
Where I B+ is the current into the non-inverting input terminals.
IB- is the current into the inverting input terminals.
44. What is Input offset voltage?
Input offset voltage is the voltage required to be amplified at the input for making output voltage to
zero volts.
45. Determine the slew rate of the op-amp. Or Define slew rate. (May/June2003, Nov/Dec2010, Nov/Dec2011, May/June 2008]
Slew rate can be defined as the maximum rate of change of output voltage of op-amp with respect to
time. It is expressed as S = (dVo / dt) max in V/Sec.Where slew rate S = 2Π f Vm in V/Sec.
46. What is a compensating network?
The networks formed by components such as resistors and capacitors for modifying the rate of
change of gain and the phase shift is called as compensating network
47. When are the internally compensating systems used?
In applications where the op-0amp is required to amplify relatively slow changing signals and does not require good high frequency response, internally compensating systems are used.
48. In response to a square wave input, the output of an op-amp changed from -3V to +3V over a
time interval of 0.25μs, find slew rate. (May '06)
Slew rate= $\Delta Vo/\Delta t = 6/0.25=24$ V/μs.
49. List the types of frequency compensation.
a. External frequency compensation
1. Dominant pole freq. compensation
2. Pole zero freq. compensation
b. Internal frequency compensation.
50. List the DC characteristics of op amp.
DC characteristics of op-amp are:
1. Input bias current
2. Input offset current
3. Input offset voltage
4. Thermal drift.
51. List the AC characteristics of opamp. (Dec 2018)
AC characteristics of op-amp are:
1. Frequency response
2. Stability of an op-amp,
3. Frequency compensation
4. Slew rate.
52. What is the need for frequency compensation in practical op-amps?
Frequency compensation is needed when large bandwidth and lower closed loop gain is desired. Compensating networks are used to control the phase shift and hence to improve the stability.
53. What are the merits of Dominant-pole compensation?
The merits of Dominant-pole compensation are:
1.Noise immunity of the system is improved.
2. Open-loop bandwidth is reduced.
54. What is the maximum undistorted amplitude, that a sine wave input of 10 KHz, can produce, at the output of an op-amp whose slew rate is 0.5V/μs? (Nov '12)

Given F=10KHZ and slew rate (S) = 0.5V/μs
Solution: Slew rate (S) = 2πfVm V/ μs.
Maximum amplitude (Vm) = S/2πf =7.92V
55. The op-amp has a gain of 12 million. Express the gain in dB.(Nov '03)
Gain in dB=20log(gain) 20 log(20*106)= 141.6dB
56. What is the need for frequency compensation in practical op-amps?
Frequency compensation is needed when large bandwidth and lower closed loop gain is desired.
Compensating networks are used to control the phase shift and hence to improve the stability.
57. Why open loop op-amp configurations are not used in linear applications?
a. The open loop gain of the op-amp is very high. Therefore, only the smaller signals having low
frequency may be amplified accurately without distortion.
b. Open loop Voltage gain of the op-amp is not a constant voltage gain varies with changes in temperature and power supply as well as mass production techniques. This makes op-amp unsuitable for many linear applications
c. Bandwidth of most open loop op-amps is negligibly small or almost zero therefore op-amp is impractical in ac applications.
58. In practical op-amps, what is the effect of high frequency on its performance?
The open-loop gain of op-amp decreases at higher frequencies due to the presence of parasitic capacitance. The closed-loop gain increases at higher frequencies and leads to instability.
59. What are the advantages of negative feedback?
Advantages of negative feedback are:
1. It reduces the gain and makes it controllable
2. It reduces the possibility of distortion
3. It increases the bandwidth
4. It increases the input resistance of the op-amp
5. It decreases the output resistance of the op-amp
6. It reduces the effect of temperature, power supply on the gain of the circuit.
Unit 5
1. What do you meant by linear circuits?
Linear circuits are the circuits in which the output signal varies with the input signal in a linear manner.
2. What do you meant by non linear circuits?
Non linear circuits are the circuits in which the output signal does not vary with the input signal.
3. Mention some of the linear applications of op – amps.(Nov/Dec' 2005)
Adder, subtractor, voltage –to- current converter, current –to- voltage converters, instrumentation
amplifier, analog computation, power amplifier, etc are some of the Linear op-amp circuits.
4. Mention some of the non – linear applications of op-amps. (Nov/Dec'2005)
Rectifier, peak detector, clipper, clamper, sample and hold circuit, log amplifier, anti –log amplifier,
multiplier are some of the non – linear op-amp circuits.
5. What are the areas of application of non-linear op- amp circuits?
The applications of non-linear op-amp are:
 . Industrial instrumentation
 . Communication
 . Signal processing
6. What is an inverting amplifier?

Inverting amplifier is the one in which a signal is applied to the inverting input terminal. The output
voltage is fed back to the inverting input terminal through feedback resistance (Rf) - input resistance (R I)
network. The output signal is the amplified form of input signal with a phase shift of 180°
7. What is a non- inverting amplifier?
Non inverting amplifier is the one in which a signal is applied to the non-inverting input terminal and
the output is fed back to the inverting input terminal, the circuit amplifies without inverting the input signal.
8. Give an application of an inverting amplifier.[May/June 2013]
Sign changer is a typical application of an inverting amplifier. It is a special case with Rf= R1 and hence
(V0/Vin) = -1
30
9. What is voltage follower? [April/May 2010, May/June 2014]
(OR)
What is an op-amp buffer? Draw the diagram. [Nov/Dec 2010]
A circuit in which the output voltage follows the input voltage is called voltage follower circuit. That is
output voltage is equal to input voltage. This circuit is also called as op-amp buffer.
10. What are the applications of V-I converter?
The applications of V-I converter are:
a. Low voltage dc and ac voltmeter
b. L E D
c. Zener diode tester
14. Give applications of voltage to current t converters.
The main applications of voltage to current converter are, LED & Zener diode tester Low voltage AC
& DC voltmeters.
15. Give the schematic of op-amp based current to voltage converter. (April/May 2010)
16. Give the circuit of a voltage to current op-amp converter. [April/May 2011]
There are two circuits available for voltage to current converter
 V to I converter with floating load
 V to I with grounded load.
31
17. What is meant by summer (summing amplifier)?
Op-amp may be used to design a circuit whose output is the sum of several input signals. Such a circuit
is called summing amplifier or summer.
18. Draw the averaging circuit using operational amplifier. [Nov/Dec 2009]
19. What is an instrumentation amplifier?
It is intended for precise, low- level signal amplification where noise, low thermal drift low. An
Instrumentation is useful for amplifying low level signals which are obtained by sensing with a transducer in
the measurement of physical quantities like temperature, water flow.
20. What is the need for an instrumentation amplifier? (May/June 2012)
In a number of industrial and consumer applications, the measurement of physical quantities is usually

done with the help of transducers. The output of transducer has to be amplified So that it can drive the
indicator or display system. This function is performed by an instrumentation amplifier.
21. What is the major function of instrumentation amplifier?
To amplify the low level output signal of a transducer so that it can drive the indicator or display is the
major function of an instrumentation amplifier.
22. List the features of instrumentation amplifier. (Nov/Dec'2013, April/May 2011,Nov/Dec 2004)
State the characteristics of an instrumentation amplifier. [Nov/Dec 2010,April/May 2005, Nov/Dec 2003]
The characteristics of an instrumentation amplifier are:
a. High gain accuracy
b. High CMRR
c. High gain stability with low temperature co-efficient
d. Low dc offset
e. Low output impedance
f. High input impedance
32
23. List the applications of instrumentation amplifier.
The applications of instrumentation amplifier are:
1. Temperature indicator
2. Temperature controller
3. Light intensity meter
4. Water flow meter
24. Draw and write the equation for of an integrator using an op-amp. (Nov/Dec'2006, May/June 2009,
Nov/Dec2010), Nov/Dec 2008,April/May 2004)[Nov/Dec 2021]
25. Why integrators are preferred over differentiator in analog computers?(May/June 2009, Nov/Dec
2011)
An analog computer can perform linear operations such as multiplication by constant, addition, subtraction and integration. These operations are sufficient for solving linear differential equations. Linear differential equations can also be solved directly by using differentiator. But the gain of the differentiator increases linearly with frequency and it tends to amplify low frequency noise, which may result in false oscillations. Therefore, integrators are preferred over differentiators in analog computers.
26. Why practical integrators are called Lossy integrators? (Or) What is Lossy integrator?
The gain of an integrator at a low frequency (dc) can be limited to avoid saturation problem if the feedback capacitor is shunted by resistance RF. The parallel combination of RF & CF behaves like practical capacitor, which dissipates power unlike an ideal capacitor. So, this circuit is called Lossy integrator.
27. What are the limitations of the basic differentiator circuit?
. At high frequency, a differentiator may become unstable and break into oscillations
. The input impedance decreases with increase in frequency, thereby making the circuit sensitive to high frequency noise.
28. What are the limitations of an ideal active differentiator?
At high frequency, differentiators may become unstable and break into oscillation. The input impedance i.e. ($1/\omega C1$) decreases with increase in frequency, thereby making the circuit sensitive to high frequency noise.

29. Write down the condition for good differentiation.
For good differentiation, the time period of the input signal must be greater than or equal to Rf C1
T > R f C1 Where, Rf is the feedback resistance, Cf is the input capacitance
30. Draw the circuit diagram of differentiator and give its output equation.
(April/May 2010,Nov/Dec'2012,Nov/Dec 2009)
31. List the applications of Log amplifiers:
 Analog computation may require functions such as ln x, log x, sin hx etc. These functions can
be performed by log amplifiers.
 Log amplifier can perform direct dB display on digital voltmeter and spectrum analyzer.
 Log amplifier can be used to compress the dynamic range of a signal.
32. Draw the circuit of a log amplifier. [April/May 2010]
33. What is an antilog amplifier? [Nov/Dec 2007]
A circuit that performs the mathematical operation of antilog is called as antilog amplifier.It performs
the reverse operation of log amplifier. Antilog amplifier is a decoding circuit to convert a logarithmically encoded signal back to the real signal
34. What is a comparator? (May/June 2012, Nov/Dec 2011, Nov/Dec2010)
A comparator is a circuit which compares a signal voltage applied at one input of an op-amp with a
known reference voltage at the other input. It is an open loop op - amp with only two possible outputs
+ Vsat and –Vsat
.
35. List the types of comparators.
The comparator has two types, they are :
 Inverting comparator
 Non-inverting comparator
36. What is Trip point?
The point at which transfer characteristics of a comparator is a straight line is called Trip point is the
input voltage at which the output changes from low to high or vice versa.
37. What are the applications of comparator? (April/May 2008, Nov/Dec 2011, Nov/Dec 2010)
 Zero crossing detectors
 Window detector
 Time marker generator
 Phase meter
 Digital interfacing
 Schmitt trigger
 Oscillators
38. What is a window detector?
A device, usually consisting of a pair of voltage comparators, in which output indicates whether the
measured signal is within the voltage range bounded by two different thresholds.
39. What are the characteristics of a comparator?
. Speed of operation
. Accuracy
. Compatibility of the output
40. What is zero crossing detectors? [May/June 2009, Nov/Dec2004]

Zero crossing detectors is one of the application of op-amp comparator. The circuit finds the point at
which the input voltage crosses zero or dc level.
36
41. Draw the input and output wave form for window detector.
42. What is a Schmitt trigger or regenerative comparator? [April/May
2010] State the principle of a regenerative comparator. [Nov/Dec 2007]
Schmitt trigger is a regenerative comparator. It converts any irregular shaped input into a square wave
output. The output of Schmitt trigger swings between upper and lower threshold voltages, which are the
reference voltages of the input waveform. The input voltage Vin > VuT, output V0 goes to -Vsat and Vin < VLT
, V0 is at +Vsat and the result is a square wave output.
43. Draw the Schmitt trigger circuit. (May/June 2009)
44. Mention two applications of schmitt trigger. [April/May2005]
Schmitt trigger is mainly used to convert very slowly varying signals into a fastly switching square
wave signals and often used as a wave shaping circuit.
37
45. Differentiate Schmitt trigger and comparator.
A Schmitt trigger is a comparator with a small amount of positive feedback applied to create hysteresis
for the input level.
46. What do you mean by a precision diode? [Nov/Dec 2009/April/May 2011]
The major limitation of ordinary diode is that it cannot rectify voltages below the cut – in voltage of the
diode. A circuit designed by placing a diode in the feedback loop of an op – amp is called the precision diode
and it is capable of rectifying input signals of the order of milli volt.
47. State the difference between conventional and precision rectifier. [April/May 2009,Nov/Dec 2014]
How does precision rectifier differ from conventional rectifier? [Nov/Dec 2012]
S.No. Conventional rectifier Precision rectifier
1 Practical diode used Precision diode used
2 Conducts when Vi>Vt = 0.7V for silicon
and 0.3V for Germanium
Diode conducts when Vi = Vt /Ad =
0.7V (Silicon)/10
5
,Vi =60μ V
3 Cross over distortion occurs Cross over distortion is completely
eliminated.
48. Write down the applications of precision diode.
The applications of precision diode are
 Half - wave rectifier
 Full - Wave rectifier
 Peak – value detector
 Clipper
 Clamper

48. What is peak detector?
The function of a peak detector is to compute the peak value of the input. The circuit follows the
voltage peaks of a signal and stores the highest value on a capacitor.
49. Draw the circuit diagram of peak detector. [May/June 2014]
38
50. What is meant by dc inserter or restorer?
The clamper is also known as dc inserter or resorter.The circuit is used to add a desired dc level to the
output voltage. The output is clamped to desired dc level.
51. How does the precision rectifier differ from the conventional rectifier? (April/May 2011, Nov/Dec'2012)
These rectifiers are used to rectify very small voltages or currents for which the diode never gets
forward biased in the conventional one. i.e. voltage or currents are always less than .7V which cannot be
rectified by normal rectifiers. This rectifier doesn't give any kind of drop in output since diodes are previously
biased using op-amp.
52. Give an application for each of the following circuits.[Nov/Dec 2013]
a. Voltage follower: It has high input impedance and low output impedance. So it is used to eliminate
loading effect. Also used as a buffer.
b. Peak detector: Used in amplitude modulation as detector and in test and measurement instrument
applications
c. Schmitt trigger: Used in wave shaping circuit to convert any input to square wave output and acts as
square wave converter.
d. Clamper: It is used to add dc signal to the ac output both in positive and negative sides. Often it is
used in Television.(TV)
53. What is a filter?
Filter is a frequency selective circuit that passes signal of specified band of frequencies and attenuates
the signals of frequencies outside the band.
54. Write the types of filters.
Filters are classified as:
a. Analog or digital
b. Passive or active
c. Audio or radio frequency.
55. Why Butterworth filter is called flat-flat filter?
The main characteristics of Butterworth filter is that, it has flat pass band as well as stop band. So, it is called flat-flat filter.
56. What are the demerits of passive filters? (Nov/Dec'2013,Nov/Dec 2003)
 Passive filters works well for high frequencies.
 At audio frequencies, the inductors become problematic, as they become large, heavy and expensive.

 For low-frequency applications, more number of turns of wire must be used which in turn adds to the series resistance degrading inductor's performance ie, low Q, resulting in high power dissipation.

57. What are the advantages of active filters?

 Active filters used op- amp as the active element and resistors and capacitors as passive elements.

 By enclosing a capacitor in the feedback loop, inductor less active filters can be obtained

 Op-amp used in non – inverting configuration offers high input impedance and low output impedance, thus improving the load drive capacity.

58. Mention some commonly used active filters:

Active filters are:

 Low pass filter (LPF)

 High pass filter (HPF)

 Band pass filter (BPF)

Band reject filter (BRF) or Band stop filter (BSF)

59. What are the advantages of active filters over the passive filters?

Active filters use amplifying elements, especially op amps, with resistors and capacitors in their

feedback loops, to synthesize the desired filter characteristics. Active filters can have high input impedance, low output impedance, and virtually any arbitrary gain.

They are also usually easier to design than passive filters. Possibly their most important attribute is that they lack inductors, thereby reducing the problems associated with those components.

60. Draw the freq. response of the LPF.

61. What is frequency scaling?

A filter is designed; there may be a need to change its cut off frequency. The procedure used to convert

an original cut off frequency to new cut off frequency is called frequency scaling.

62. Define bandwidth of a filter.[Nov/Dec 2014]

Bandwidth is defined as the difference between higher cut off frequency and lower cut off frequency. It is give as BW=fH -fL

63. What is the function of phase shifter circuits? (May 2018)

 The phase shift circuits produce phase shifts that depend on the frequency and maintain a constant

gain. These circuits are also called constant-delay filters or all-pass filters.

 That constant delay refers to time difference between input and output remains constant when

frequency is changed over a range of operating frequencies.

64. Write the other name for clipper circuit. (May 2018)

Diode clipper is also known as Diode Limiter, is a wave shaping circuit that takes an input waveform and

clips its top half, bottom half or both halves together.

65. Draw the circuit of op amp as a subtractor. [Nov/Dec 2021]