**Unit:3**

1. **Define VCO.**

A voltage controlled oscillator is an oscillator circuit in which the frequency of oscillations can be controlled by an externally applied voltage.

1. **List the features of 566 VCO.**

•Wide supply voltage range (10-24V)

•Very linear modulation characteristics

•High temperature stability

1. **Mention some areas where PLL is widely used:**

•Radar synchronisation

•satellite communication systems

•air borne navigational systems

•FM communication systems

1. **List the basic building blocks of PLL:**

•Phase detector/comparator

•Low pass filter

•Error amplifier

•Voltage controlled oscillator

1. **What are the three stages through which PLL operates?**

•Free running

•Capture

• Locked/ tracking

1. **Define lock-in range of a PLL:**

The range of frequencies over which the PLL can maintain lock with the incoming signal is called the lock-in range or tracking range. It is expressed as a percentage of the VCO free running frequency.

1. **Define capture range of PLL:**

The range of frequencies over which the PLL can acquire lock with an input signal is called the capture range. It is expressed as a percentage of the VCO free running frequency.

1. **Define Pull-in time.**

The total time taken by the PLL to establish lock is called pull-in time. It depends on the initial phase and frequency difference between the two signals as well as on the overall loop gain and loop filter characteristics.

1. **For perfect lock, what should be the phase relation between the incoming signal and VCO output signal?**

The VCO output should be 90 degrees out of phase with respect to the input signal.

1. **Give the classification of phase detector**

: •Analog phase detector •Digital phase detector

1. **What is a switch type phase detector?**

An electronic switch is opened and closed by signal coming from VCO and the input signal is chopped at a repetition rate determined by the VCO frequency. This type of phase detector is called a half wave detector since the phase information for only one half of the input signal is detected and averaged.

1. **What is a voltage controlled oscillator?**

Voltage controlled oscillator is a free running multivibrator operating at a set frequency called the free running frequency. This frequency can be shifted to either side by applying a dc control voltage and the frequency deviation is proportional to the dc control voltage.

1. **On what parameters does the free running frequency of VCO depend on?**
   * External timing resistor,RT
   * External timing capacitor,CT
   * The dc control voltage Vc.

1. **What is the purpose of having a low pass filter in PLL?**

It removes the high frequency components and noise. Controls the dynamic characteristics of the PLL such as capture range, lock-in range, band-width and transient response. The charge on the filter capacitor gives a short- time memory to the PLL.

1. **Discuss the effect of having large capture range.**

The PLL cannot acquire a signal outside the capture range, but once captured, it will hold on till the frequency goes beyond the lock-in range. Thus , to increase the ability of lock range, large capture range is required. But, a large capture range will make the PLL more susceptible to noise and undesirable signal.

1. **Mention some typical applications of PLL:**

•Frequency multiplication/division

•Frequency translation

•AM detection

•FM demodulation

•FSK demodulation.

**17. List the broad classification of ADCs.**

1. Direct type ADC.

2. Integrating type ADC.

**18. List out the direct type ADCs.**

1. Flash (comparator) type converter

2. Counter type converter

3. Tracking or servo converter

4. Successive approximation type converter

**19. List out some integrating type converters.**

1. Charge balancing ADC

2. Dual slope ADC

**20. What is integrating type converter?**

An ADC converter that perform conversion in an indirect manner by first changing the analog I/P signal to a linear function of time or frequency and then to a digital code is

known as integrating type A/D converter.

**21. Explain in brief the principle of operation of successive Approximation ADC.**

The circuit of successive approximation ADC consists of a successive approximation

register (SAR), to find the required value of each bit by trial & error. With the arrival of START command, SAR sets the MSB bit to 1. The O/P is converted into an analog signal

& it is compared with I/P signal. This O/P is low or High. This process continues until all

bits are checked.

**22. What are the main advantages of integrating type ADCs?**

i. The integrating type of ADC’s doing not need a sample/Hold circuit at the input.

ii. It is possible to transmit frequency even in noisy environment or in an isolated form.

**23. Where is the successive approximation type ADC’s used?**

The Successive approximation ADCs are used in applications such as data loggers &

instrumentation where conversion speed is important.

**24. What is the main drawback of a dual-slop ADC?**

The dual slope ADC has long conversion time. This is the main drawback of dual slope

ADC.

**25. State the advantages of dual slope ADC:**

It provides excellent noise rejection of ac signals whose periods are integral multiples of

the integration time T.

Where T---clock period; Tc---conversion time ; n----no. of bits.

**26. Define resolution of a data converter.**

The resolution of a converter is the smallest change in voltage which may be produced at

the output or input of the converter.

Resolution (in volts)= VFS/2n-1=1 LSB increment.

**27. What are the requirements for producing sustained oscillations in feedback circuits?**

For sustained oscillations, ” The total phase shift around the loop must be zero at the

desired frequency of oscillation and the magnitude of the loop gain |

A β | should be equal to unity.

**28. Mention any two audio frequency oscillators:**

RC phase shift oscillator

Wein bridge oscillator

**29. Mention some applications of 555 timer:**

\*Oscillator

\*pulse generator

\*ramp and square wave generator

\*mono-shot multivibrator

\*burglar alarm

\*traffic light control.

**30. List the applications of 555 timer in monostable mode of operation:**

\*missing pulse detector

\*Linear ramp generator

\*Frequency divider

\*Pulse width modulation.

**31. List the applications of 555 timer in Astable mode of operation:**

\*FSK generator

\*Pulse-position modulator