1. **What are the disadvantages of Analog communication?**

   Its not reliable, Noise effect is more on the signals, Power required for signal transmission also more, Circuit complexity is more and costly.

2. **What are the Advantages of Digital Communication?**

   Reliable, Noise effect is very less, power consumption is very less, various Digital ICs are available so circuits not complex , cheap, Error detection and correction is also possible.

3. **What are different types of digital modulation?**

   ASK, FSK, PSK, PCM, DPCM,Delta modulation, Adaptive Delta modulation etc..

4. **How to convert an analog signal into digital signal?**

   Blocks: Anti aliasing filter, Sampler, Quantizer, encoder.

5. **Define the functionality of Sampler, Quantizer?**

   Sampler: converts a continuous time signal into discrete time signal.

   Quantizer: converts continuous in amplitude signal into discrete in amplitude signal.

6. **What are some Coding techniques?**

   Pulse code modulation, Differential pulse code modulation, Delta modulation, Adaptive delta modulation.

7. **What is Sampling?**

   Converting a continuous time signal into discrete in time signal is called as Sampling (similar to cutting a bread into slices)
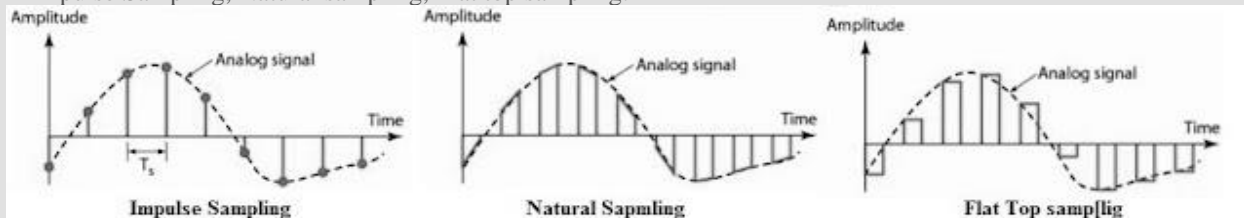
8. **Define Sampling theorem?**

   To reconstruct the Continuous time signal from discrete time signal ,the sampling frequency should be more than equal to twice of Continuous time signal frequency(max).

9. **What is Nyquist Rate?**

   If the sampling frequency is twice of Continuous time signal frequency(max), then that is called as Nyquist rate.

10. **How many types of samplings are their? Explain briefly?**

    Impulse Sampling, Natural sampling, Flat top sampling.

Impulse Sampling   Natural Sapmling   Flat Top samp[lig

11. **What is aliasing effect? How to overcome it?**

    Due to imperfect sampling the signals will be interfered in frequency domain i.e called aliasing effect in sampling. if sampling theorem satisfied in sampling or first by passing signal from anti aliasing filter before sampling then aliasing effect will be reduced

12. **What are the Analog pulse modulation methods?**

    Pulse amplitude modulation, pulse width modulation and pulse position modulation..

13. **Define Pulse amplitude modulation?**

    The carrier pulse height (amplitude) proportional to amplitude of messege signal.

14. **Define Pulse width modulation?**

    The carrier pulse width proportional to amplitude of message signal.

15. **Define Pulse position modulation?**

    The carrier pulse position proportional to amplitude of message signal.

16. Compare PAM, PWM, PPM?

	PAM	PWM	PPM
Pulse amplitude	variable	constant	constant
Pulse width	constant	variable	constant
Pulse position	constant	constant	variable
Bandwidth	less	High	High
Power required	Low	Moderate	Highest
Complexity	Low	Moderate	Highest

17. What is Amplitude shift Keying (ASK) ?

It represent the digital data as variations in amplitudes in carrier wave. i.e '1' represented by transmitting a fixed amplitude carrier wave for the bit duration with constant frequency.

18. What is Phase shift keying (PSK)?

It represent the digital data as variations in phase shift in carrier wave. i.e '1' represented by 0 phase shift carrier wave , where '0' represented as 180 phase shift incarrier wave for the bit duration with constant frequency

19. What is Frequency shift keying (FSK) ?

It represent the digital data as variation in frequency in carrier wave, i.e for '1' more than carrier frequency , for '0' less than carrier frequency.

20. What is Binary Phase shift Keying (BPSK) ?

for each one bit of binary data (0 & 1) carrier phase will be changed (two different shifts: 0, 180)

21. What is Quadrature Phase shift Keying (QPSK) ?

for each two bits of binary data (00,01,10 & 11) carrier phase will be changed (four different shifts : 45, 135, -45, -135)

22. What is the difference between Bit Rate and Baud Rate?

Bit rate represents Bits per sec,Baud rate represents no. of symbols per second i.e. in communications the no. of bits transmitted per sec is called as Bit Rate (units bps) and The no. of times a signal (here carrier) changes its state (change in freq, phase, amplitude) per sec is called as Baud rate.

23. What is bandwidth of BPSK signal?

2Fc, if Fc represents carrier frequency

24. Compare ASK, PSK and FSK.?

Bandwidth: ASK< PSK < FSK

Power: ASK <PSK = FSK

Probability of error: ASK > PSK > FSK

Signal to Noise Ratio: ASK < PSK < FSK

25. Why is ASK called as ON-OFF keying?

When input data is 1 then output is carrier, if input is 0 out put is zero. so its looks like a switch which will switch on when input is 1 and off when input is zero

26. Define Pulse code modulation?

Each and every quantized sample will be encoded with sequence of zeros and ones with 'n' bits within sampling interval (Ts), So the bit duration will be Ts/n. as no. of bits (n) increases error decreases but bandwidth increases.

27. How bits are needed to encode N different levels?

$Log_2 N$

28. Define step size?

It is the difference between two successive no.s (levels), i.e. voltage difference between one digital level and the next digital level. (Ex: 000 & 001, 1011 & 1100)

29. How to calculate Step size in PCM?

step size(Δ) = $(V_{FS} - V_{min})/L$

where $L = 2^n$, n = no. of bits, VFS = full scale voltage

30. Define Quantization error?

It is the difference between sampled signal and Quantized signal.

31. What is the max value of Quantization error?

Half of the Step size.

32. What are the applications of PCM?

computer Disk, Digital Telephony, Digital Audio Applications, etc.

33. What are the disadvantages of Pulse code modulation?

To get less Quantization Noise no. of bits should be increased, then bandwidth will be increased. So we have to compromise with either Quantization error or bandwidth.

34. Define Differential pulse code modulation?

In DPCM, The difference between the consequent samples will be encoded with sequence of zeros and ones.

35. Why DPCM is better than PCM?

Instead of encoding each sample, Its better to encode the difference between samples then Quantization error will be minimized with less no. of bits, then bandwidth also get decreased.

36. Define Delta modulation? Why it is better?

It is same as DPCM with no. of bits to encode is one bit only (either 0 or 1). by this bandwidth will be decreased.

37. What is granular noise? Define slope overload?

The Delta modulation is efficient when and only when signal is varying continuously with less variations. if signal varies suddenly then we get two different Noises. those are slope overload and granular noise

38. When granular noise and slope overload occur in Delta modulation?

Granular Noise: $\Delta / T_s >$ slope of signal

Slope Overload Noise: $\Delta / T_s <$ slope of signal
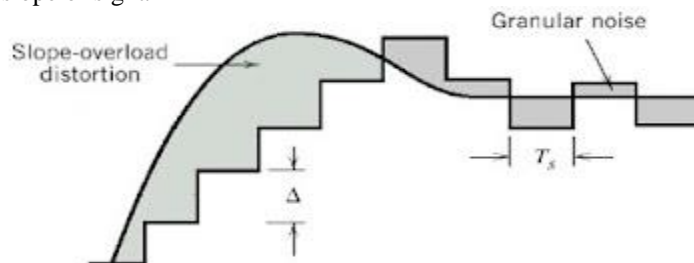
39. What is Adaptive Delta Modulation and what are the advantages?

If the step size varies according to the slope of the signal then that is called as Adaptive Delta modulation. granular and
slope over load noise will be desuced.

40. Compare all Digital pulse modulation techniques (PCM, DPCM, DM, ADM)?

	PCM	DPCM	DM	ADM
No. of bits needed	more	less	1	1
Bit duration	very less	less	T_s	T_s
Bandwidth	very high	high	$1/T_s$	$1/T_s$
Circuit complexity	high	high	less	less
Step size	very less	less	high	varies
Quantization error	high	less	less	less

41. What is multiplexing? How many types of multiplexing possible in communication?

Combining two or more signals to pass through a channel is called as multiplexing.

The different Multiplexing techniques are:1) Frequency division Multiplexing, 2) Time division Multiplexing, 3)
Wavelength division multiplexing, 4) Orthogonal frequency division multiplexing.

42. What is Line coding and what are the different line coding techniques?

Line coding is the representation of digital data (0,1) as puses. the types in line coding are: Non Return to Zero
(NRZ), Return to Zero (RZ), Biphase, Differential Manchester, Bipolar

43. What is the difference between Source coding and Line coding?

Source Coding is used to represent analog signals in form of Digital data (like PCM,DPCM,DM), where Line
Coding is used to represent digital data in the form of pulses (like NRZ, RZ)

44. Define ISI (Inter symbol Interference)?

It is a Distortion in digital signal that one symbol interferes with other symbol.

45. What is Matched filter?

It is an optimal linear filter for maximizing the SNR (Signal to Noise Ratio) in the presence of additive random
noise.

46. What is the cause of inter symbol Interference (ISI) and it can be reduced?

ISI caused by multipath propagation and inherent non linear frequency response of channel. It can be reduced by
pulse shaping.

47.What is multipath Interference?

When a signal reaches to transmitter in various paths then delays exist in each path so at receiver all delayed signals
will be received, then original signal will be interfered by its delayed versions. That is called multipath interference.

51. What is frequency synthesizer?

it is an oscillator which can generate any range of frequencies.

Applications of frequency synthesizer?

52. Define polar encoding?

It is a line code of RZ (Return to Zero) in which binary 1 represented by +ve voltage and 0 represented by zero volts.

53. Define bipolar encoding?

It is a line code of NRZ (Non Return to Zero) in which two non zero values are for encoding binary data.

54. Define Manchester encoding?

It is a line code which will generated based on clock and binary data. The code is XOR logic of clock and digital data.

55. What are the features of Code Division Multiple Access?

The CDMA technique is more secure communication over all, this is used in military, If we know the code which is used to encode the data, then only we can receive the data. But No. of users are limited (depends on code length)

56. Explain about Frequency Division Multiple Access?

In FDMA Spectrum is divided into segments and each segment is permanently assigned to each transmitter. so to get more efficiency in using spectrum, each signal bandwidth should be less and perfect modulation technique should be used.

57. Explain about Time division Multiple Access?

In this a fraction of time slot will be assigned to each transmitter, so as no. of transmitters increases complexity increases. for this perfect synchronization is required.