EXPERIMENT NO-9

PULSE CODE MODULATION & DEMODULATION

Aim: To study of Pulse code Modulation and Demodulation
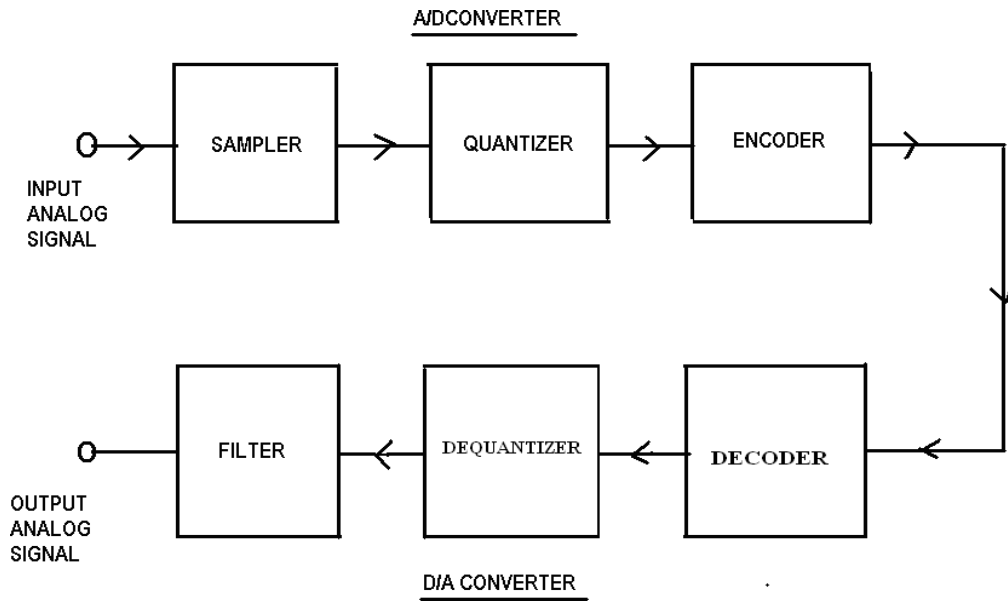
Apparatus: 1. **PCM transmitter trainer.**
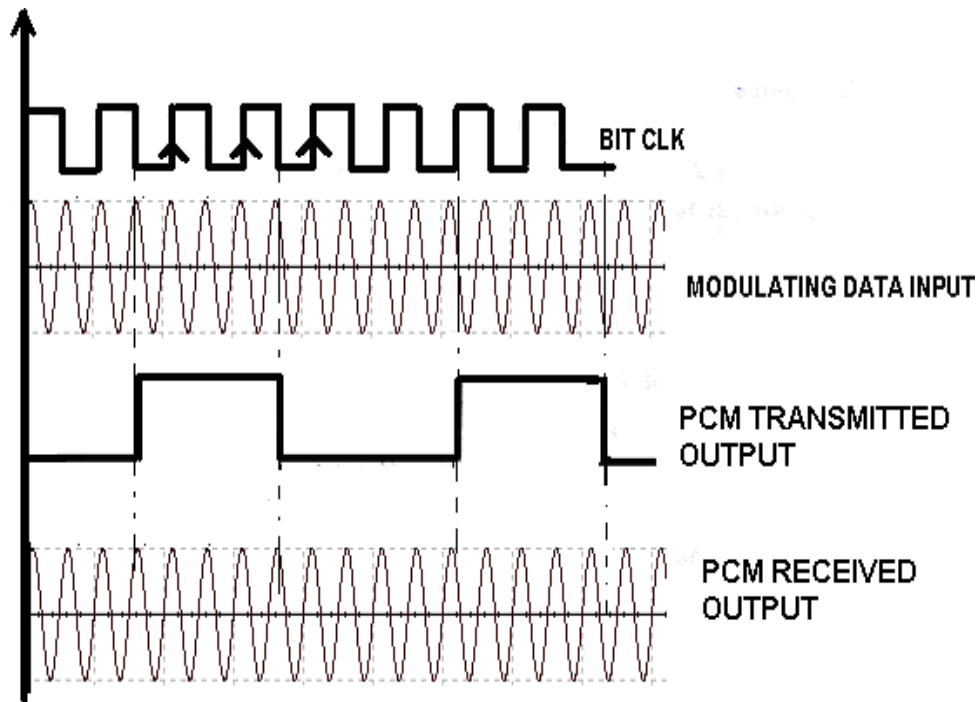2. PCM receiver trainer.
3. CRO and connecting wires.

Theory:

In the PCM communication system, the input analog signal is sampled and these samples are subjected to the operation of quantization. The quantized samples are applied to an encoder. The encoder responds to each such a sample by generation unique and identifiable binary pulse. The combination of quantize and encoder is called analog to digital converter. It accepts analog signal and replaces it with a successive code symbol, each symbol consists of a train of pulses in which the each pulse represents a digit in arithmetic system.

When this digitally encoded signal arrives at the receiver, the first operation to be performed is separation of noise which has been added during transmission along the channel. It is possible because of quantization of the signal for each pulse interval; it has to   determine   which   of   many   possible   values   has   been   receive

Block Diagram:

A/DCONVERTER

SAMPLER	QUANTIZER	ENCODER

INPUT
ANALOG
SIGNAL

FILTER	DEQUANTIZER	DECODER

OUTPUT
ANALOG
SIGNAL

D/A CONVERTER

Output Waveform:

BIT CLK

MODULATING DATA INPUT

PCM TRANSMITTED
OUTPUT

PCM RECEIVED
OUTPUT

Procedure:

1. The two inputs of function generator are connected to channel -0 and channel-1 simultaneously that is DC_1 output to channel -0 and DC_2 to channel-1.
2. With the help of oscillator DC_1 output is adjusted to 0 volts.
3. Transmitter and receiver are connected by the synchronization of clock pulses and by connecting ground transmitter to ground receiver.
4. The transmitter is connected to the input of receiver to go the original signal at the receiver output.
5. After connection is made the inputs channel 1 and channel 0 are noted. The sampled output of bit channels are taken by connecting DC_1 output to channel 0 and DC_2 output to channel-1.
6. The phase shift of a channel can be obtained by comparing the input and output of channels at the transmitter block.
7. Thus the output of transmitter can be noted down and input of receiver is similar to that.
8. The receiver output signals are noted down at channel 0 and channel 1 of the receiver block.

Result:

Questions:

1. What is the expression for transmission bandwidth in a PCM system?
2. What is the expression for quantization noise /error in PCM system?
3. What are the applications of PCM?
4. What are the advantages of the PCM?

5. What are the disadvantages of PCM?