Experiment 1 - Flat Top Sampling

Aim:

To design and demonstrate the working of the flat top sampling circuit for a Hz. message signal. Demonstrate the effect of (a) under sampling (b) over sampling (c) right sampling.

Components Required:

Transistor (SL 100, SK 100), Resistors, Capacitors, Op-amp.

Theory:

In the sampling process, an analog signal is converted into a corresponding sequence of samples that are usually spaced uniformly in time. g(t) is necessary so that we can choose the sampling rate properly, so that the sequence of samples uniquely defines the original analog signal.

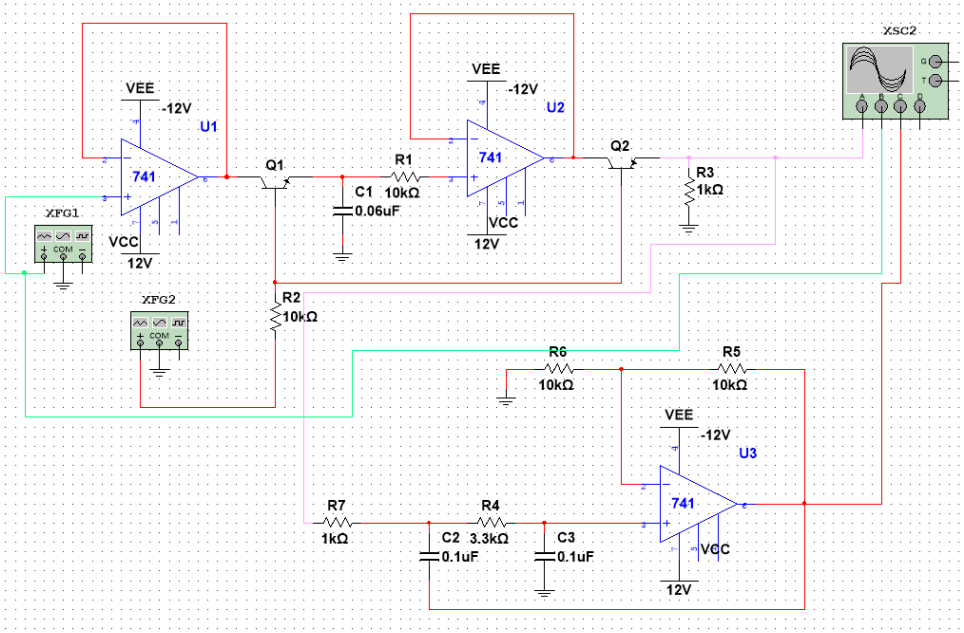
Sampling Theorem:

A band limited signal of finite energy, which has no frequency components higher than 'W' hertz, may be completely recovered from the knowledge of its samples taken at the rate of 2W samples per second.

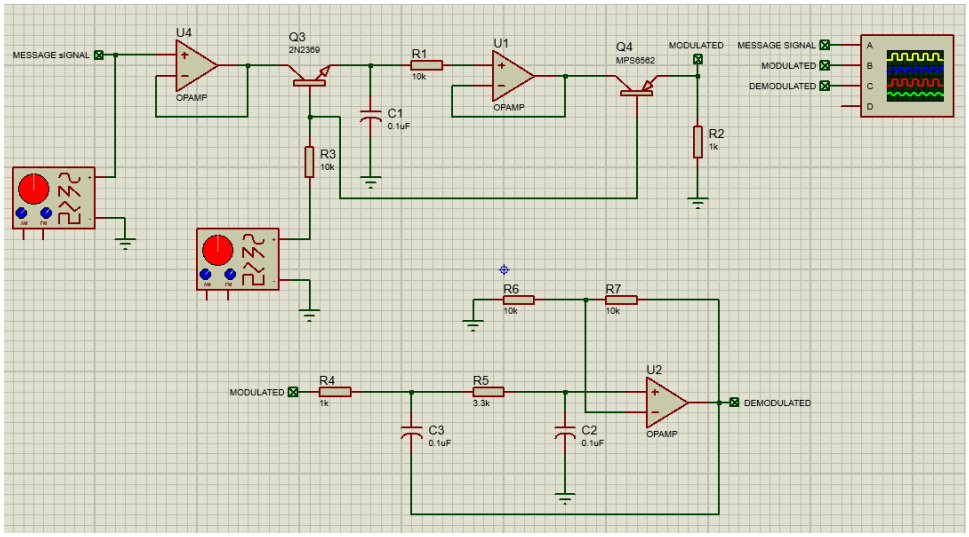
Quantizing:

Representing the analog sampled values by a finite set of levels is called quantizing i.e., it converts continuous amplitude samples to a discrete amplitude samples. Sampling Converting a continuous time signal to a discrete time signal.

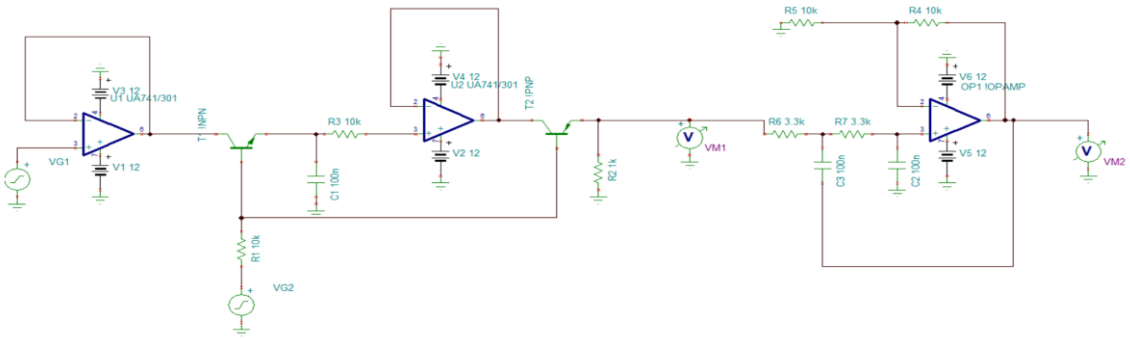
Circuits:



Schematic in Multisim

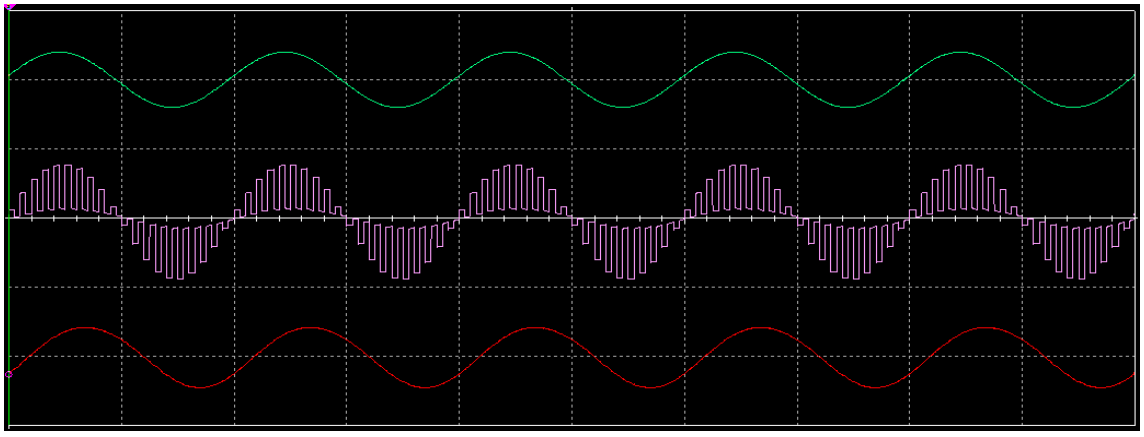


Schematic in Proteus

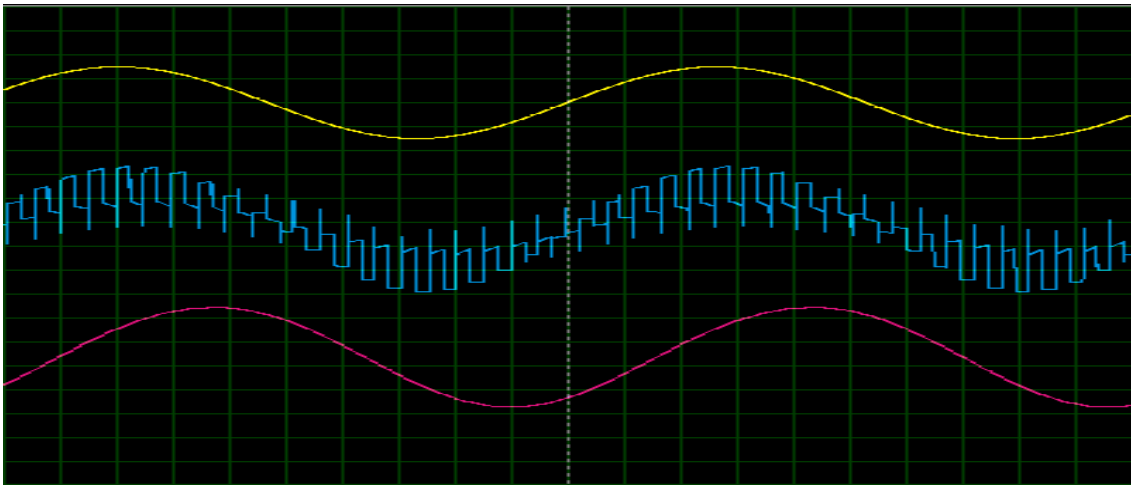


Schematic in Tina

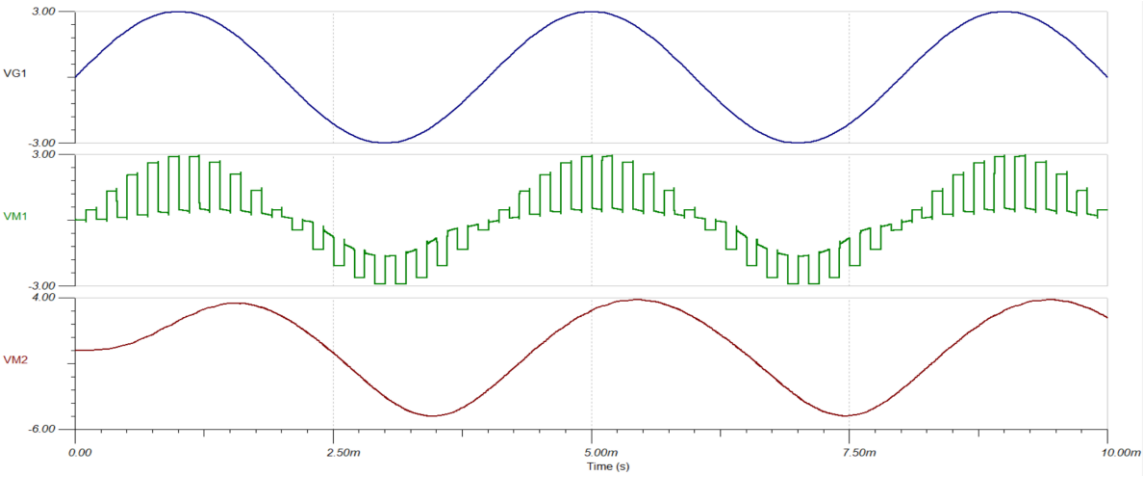
Waveforms:



Output Waveforms in Multisim



Output Waveforms in Proteus



Output Waveforms in Tina

Applications:

Sampling theorem serves as the basic for the interchangeability of analog signals and digital sequences, which is so valuable in digital signal processing, and digital communications.

Experiment 2 - Time Division Multiplexing

Aim:

To design and demonstrate the working of TDM and recovery of two band limited signals of PAM signals.

Components Required:

Transistors—SL100, SK100, Resistors, Op-amp

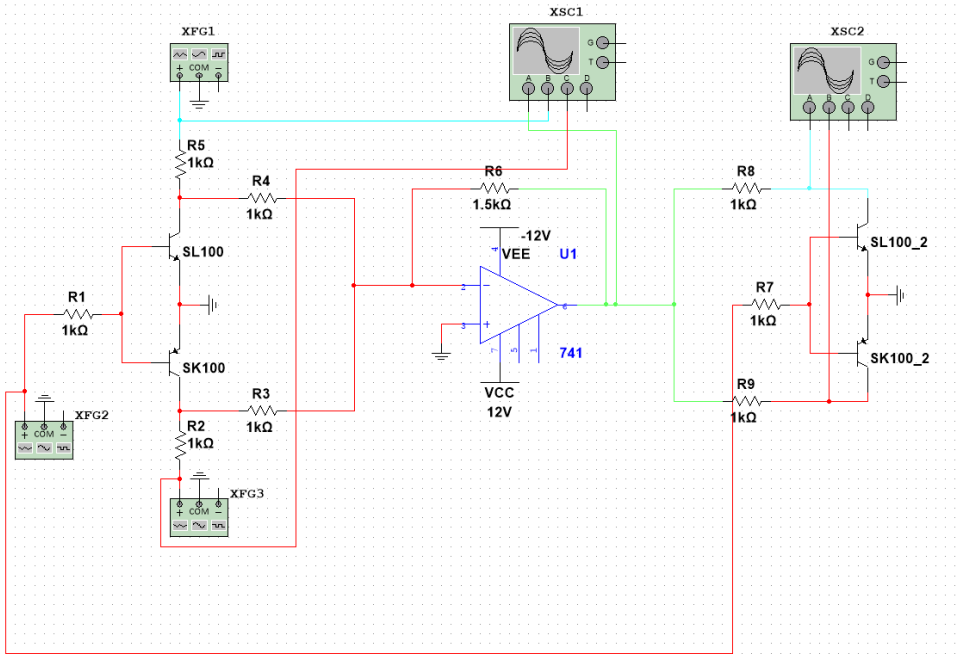
Theory:

TDM is a technique used for transmitting several message signals over a communication channel by dividing the time frame into slots, one slot for each message signal. This is a digital technique in which the circuit is highly modular in nature and provides reliable and efficient operation.

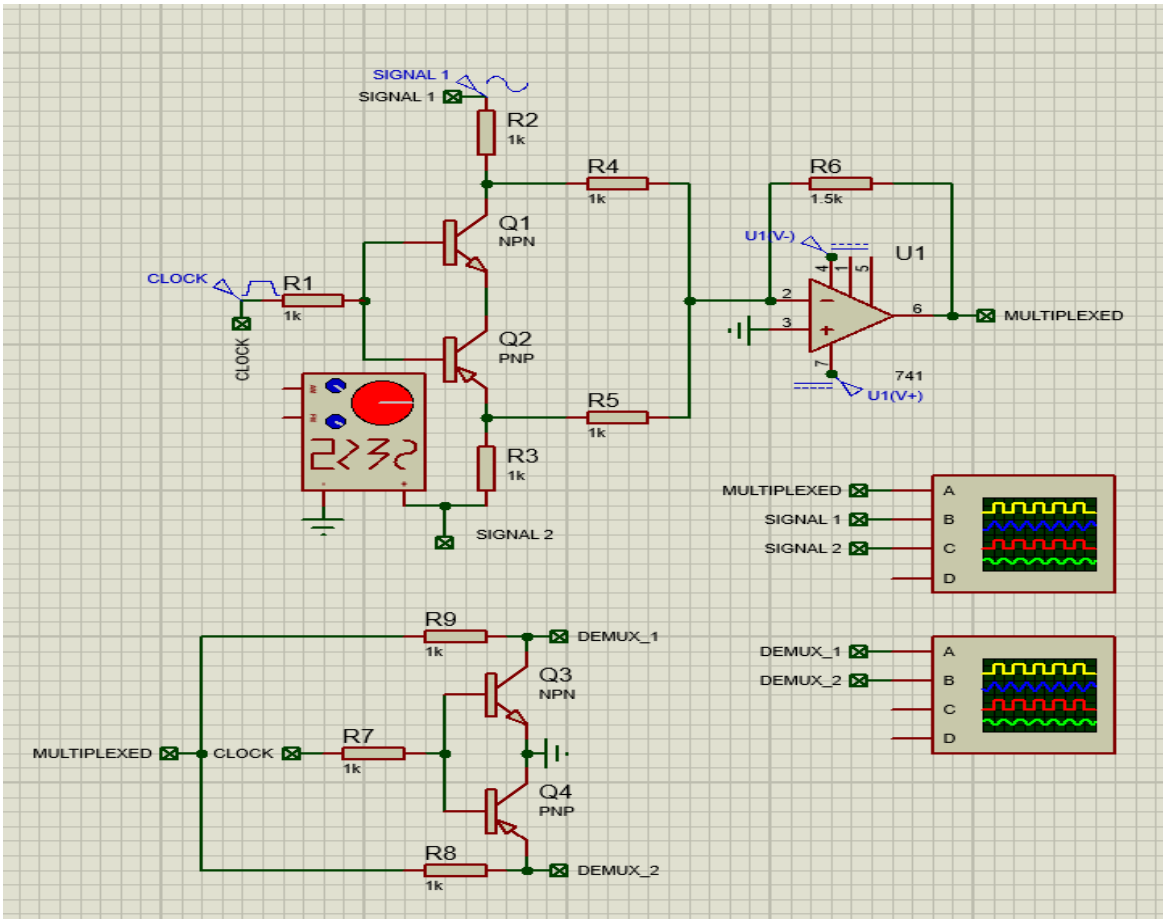
There is no cross talk in TDM due to circuit non-linearities since the pulses are completely isolated. But it also has its disadvantages, which include timing jitter and synchronization is required.

In pulse-amplitude modulation, the amplitude of a periodic train of pulses is varied in pro-portion to a message signal. TDM provides an effective method for sharing a communication channel.

Circuits:



Schematic in Multisim



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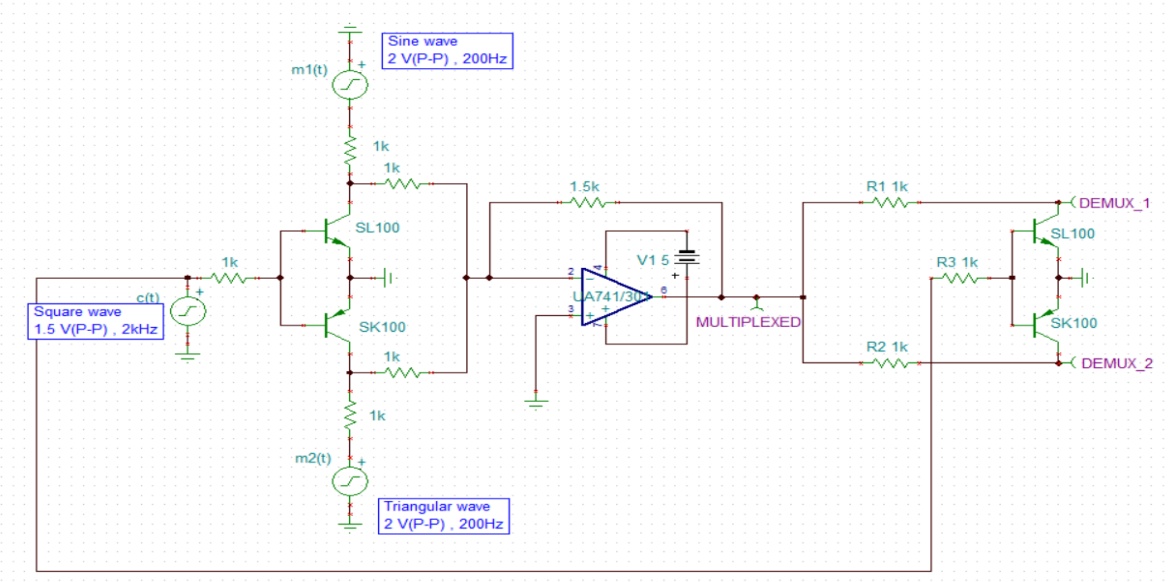
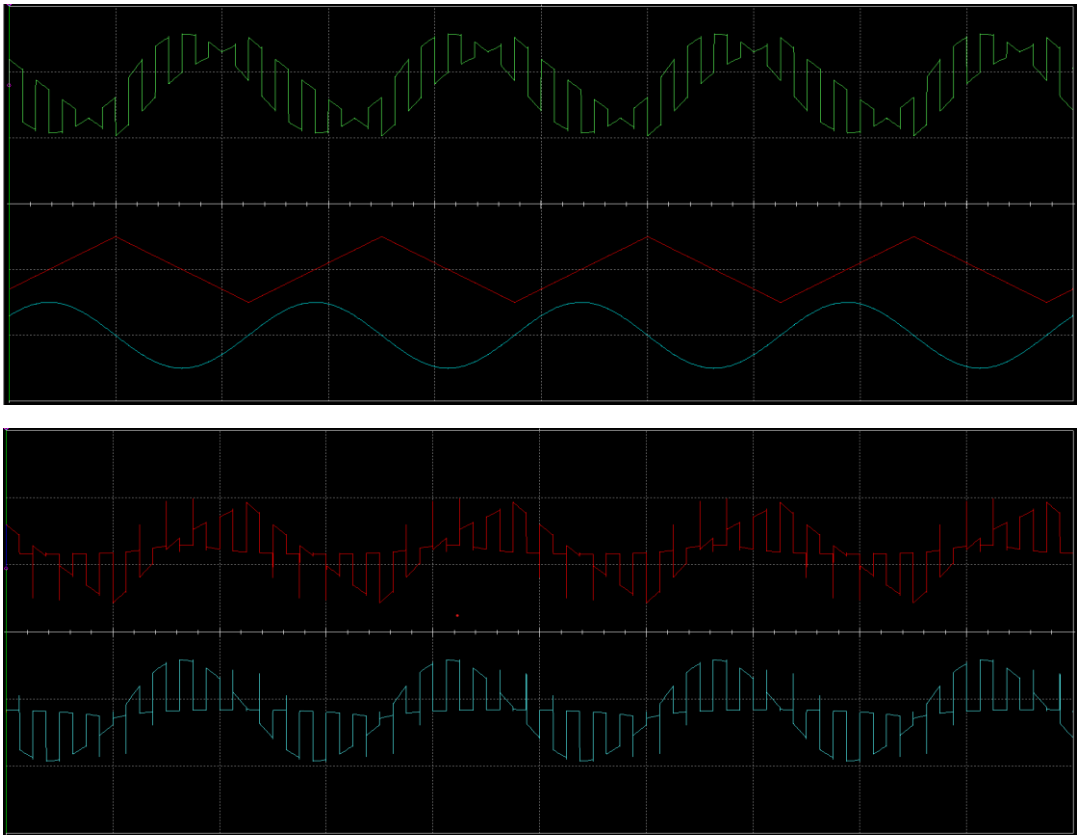
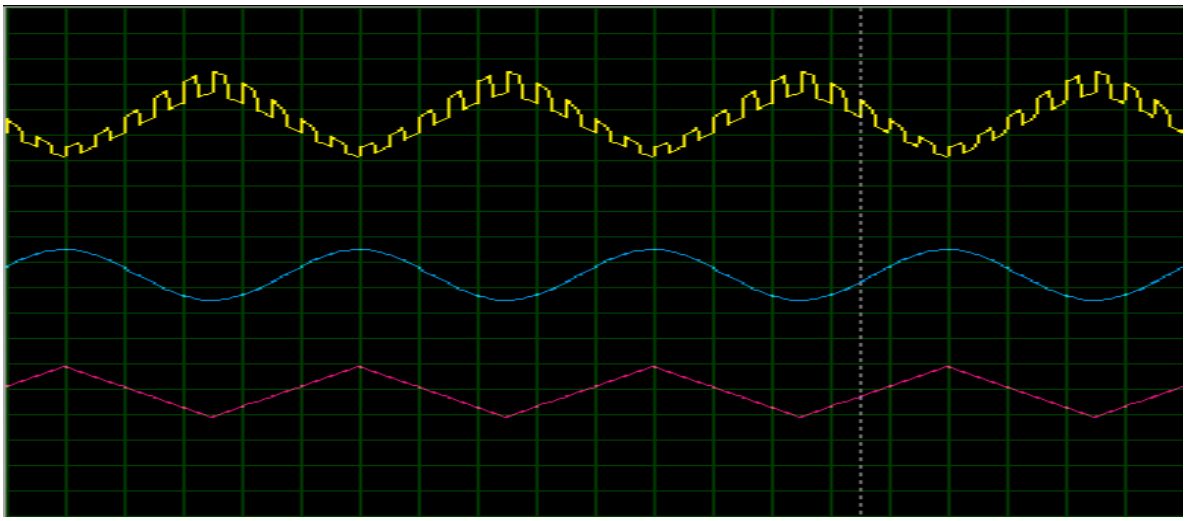


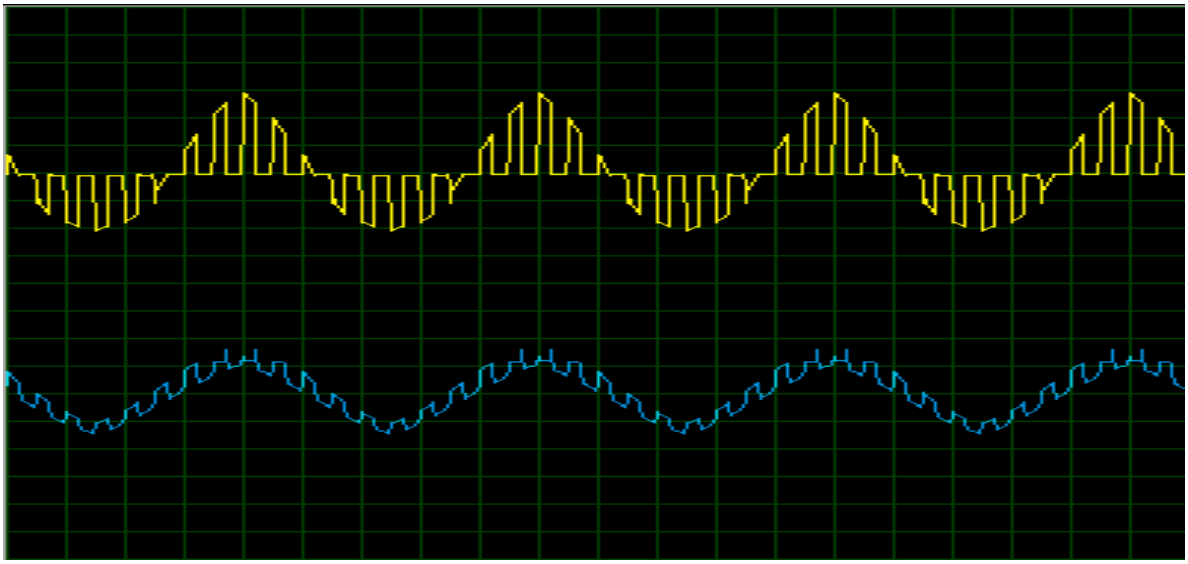
Schematic in Tina

Waveforms:

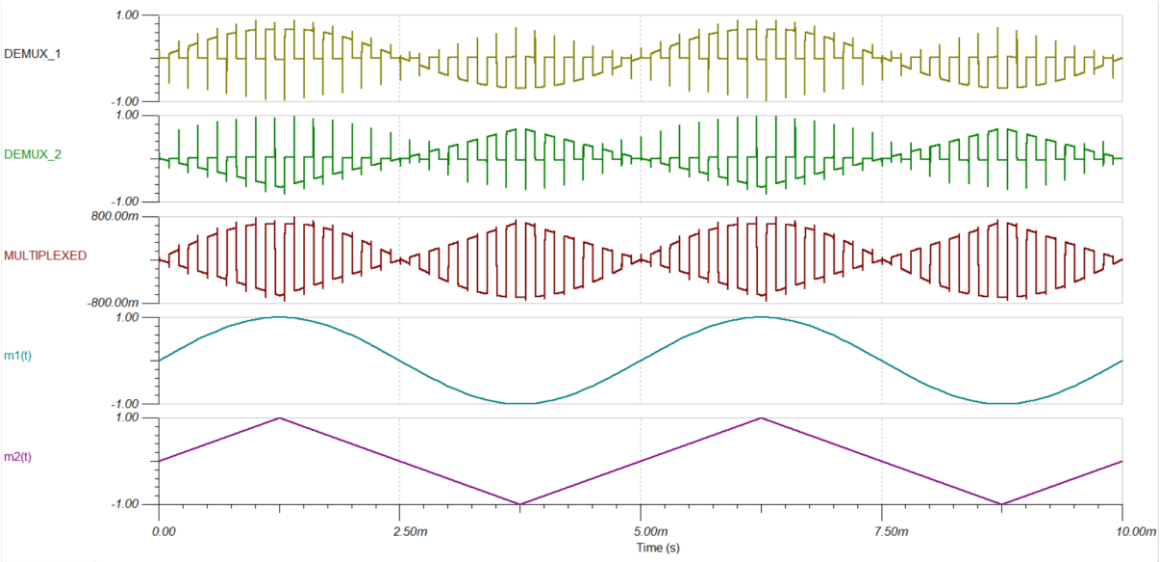


Output Waveforms in Multisim





Output Waveforms in Proteus



Output Waveforms in Tina

Applications:

- Single Line Communication
- Telephonic Communication

Experiment 3 - Amplitude Shift Keying (ASK)

Aim:

To design and verify the operation of ASK generator and demodulator.

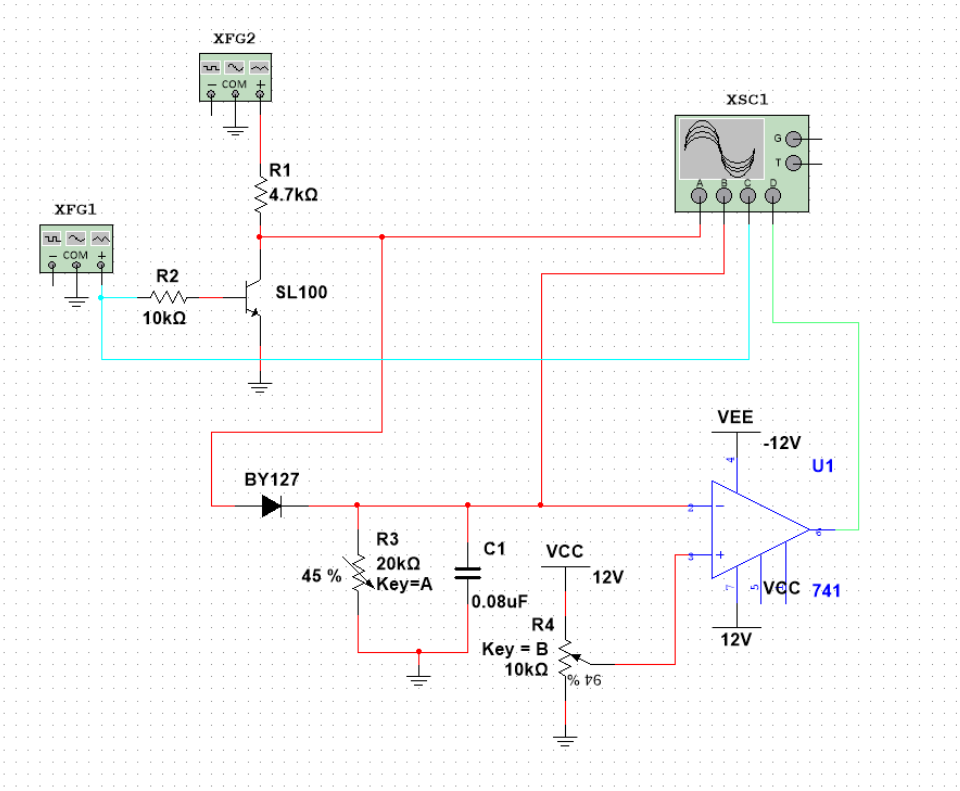
Components Required:

Transistor SL100, Resistors, Potentiometers, Op-amp, Diode-BY127

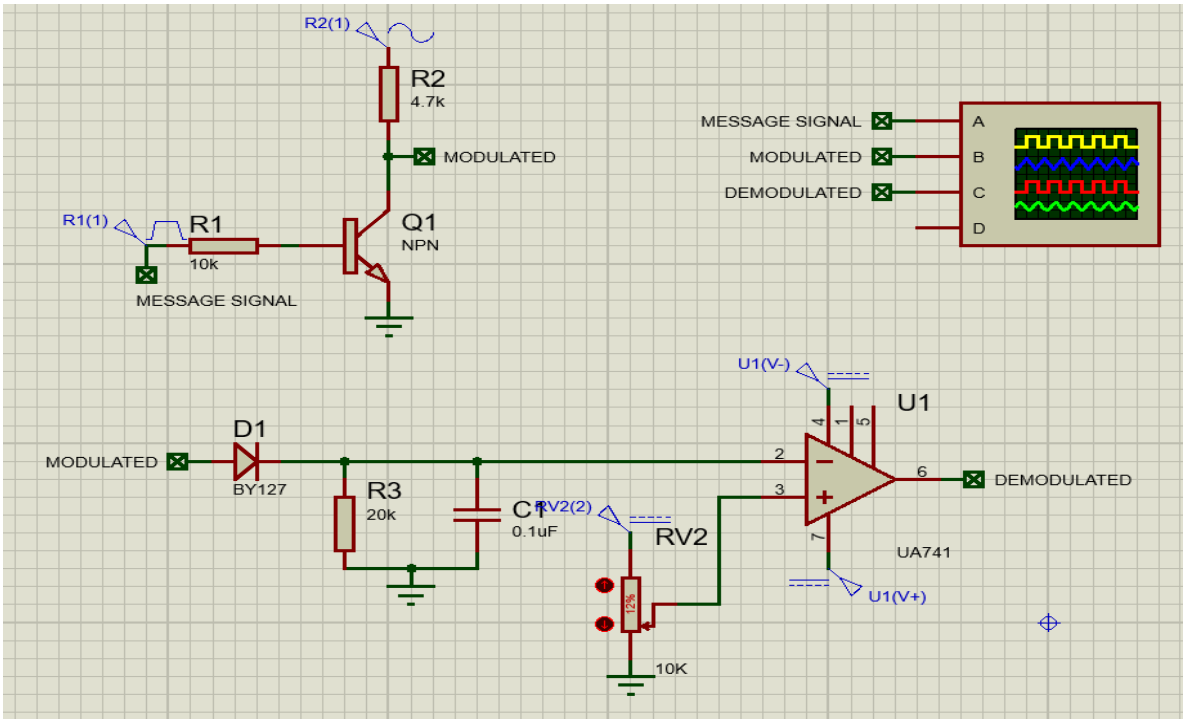
Applications:

Digital data communication for a large number of low-frequency RF applications.

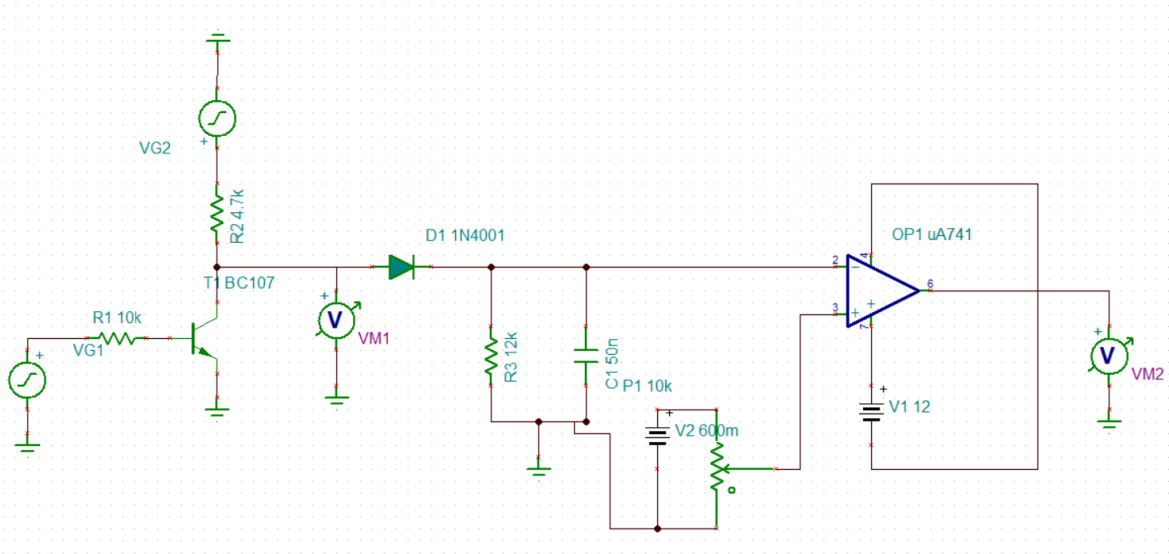
Circuits:



Schematic in Multisim

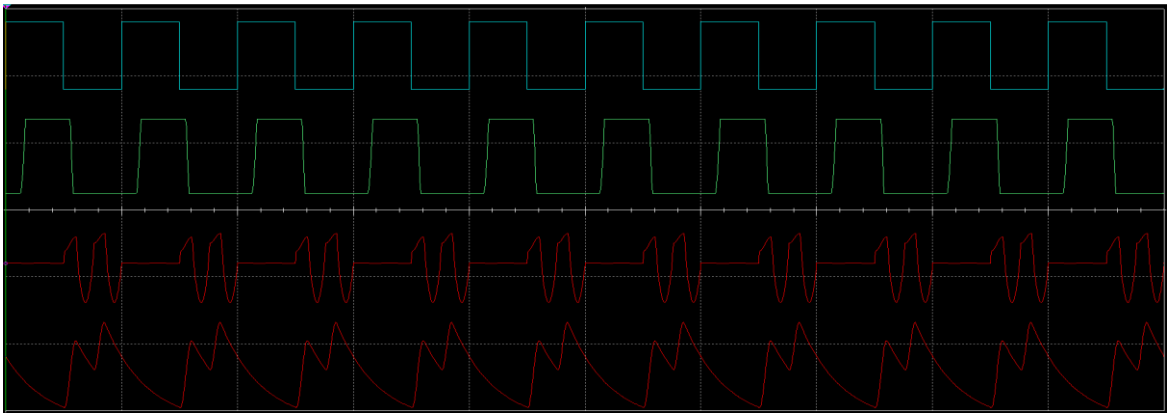


Schematic in Proteus

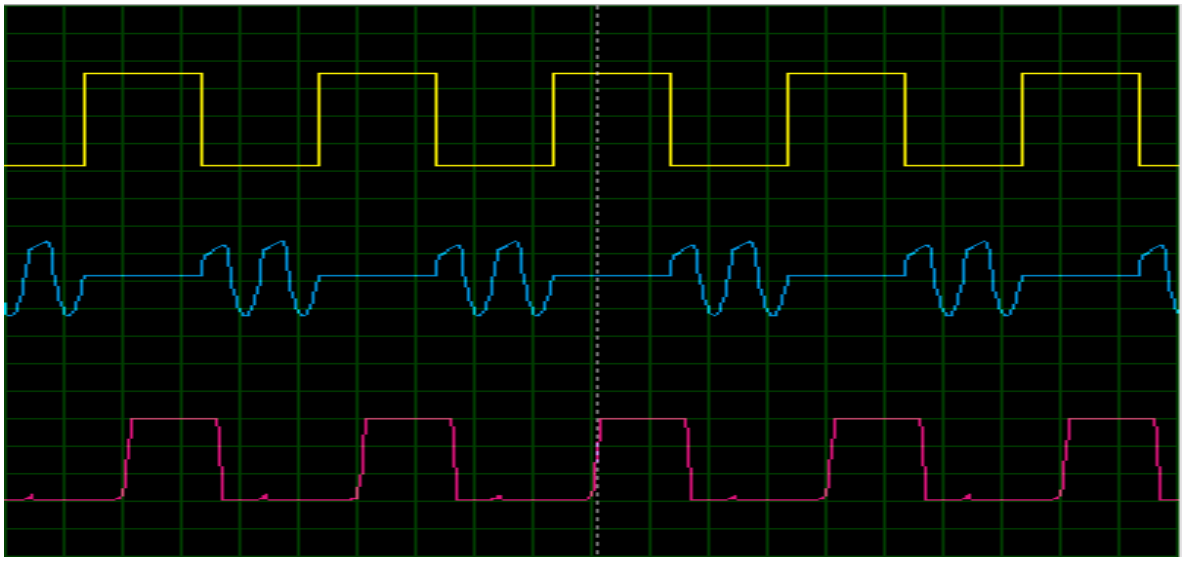


Schematic in Tina

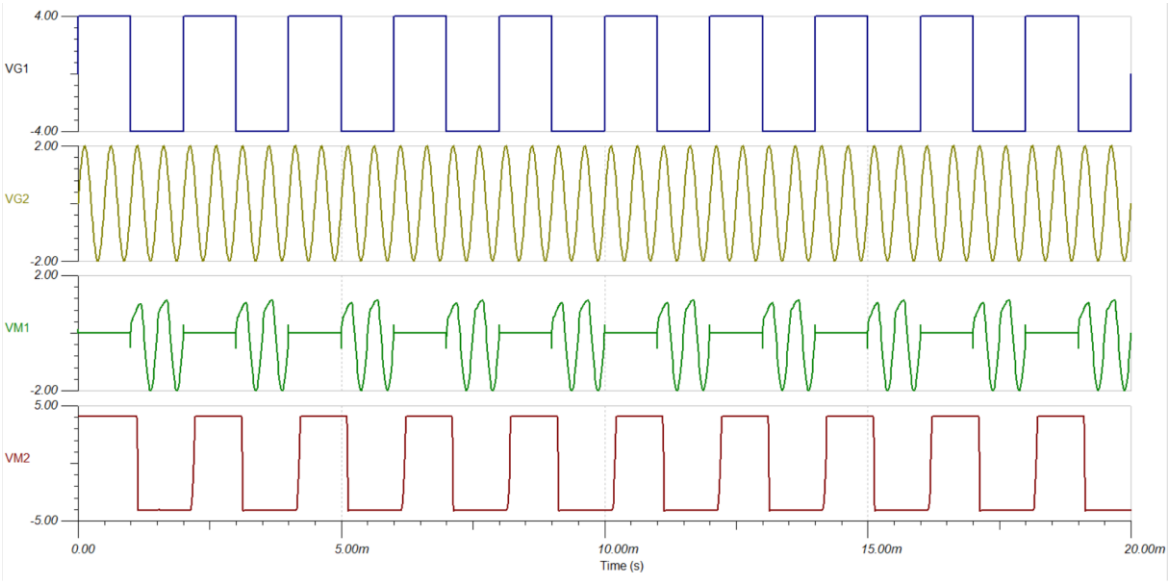
Waveforms:



Output Waveforms in Multisim



Output Waveforms in Proteus



Output Waveforms in Tina