Task-2

Design and Generation of Amplitude Demodulation

Aim: To detect the original signal from the amplitude modulated signal using envelope detection

Components required:

(i) AM generator
(ii) Diode
(iii) Resistors
(iv) Capacitor
(v) Bread-board.

Procedure

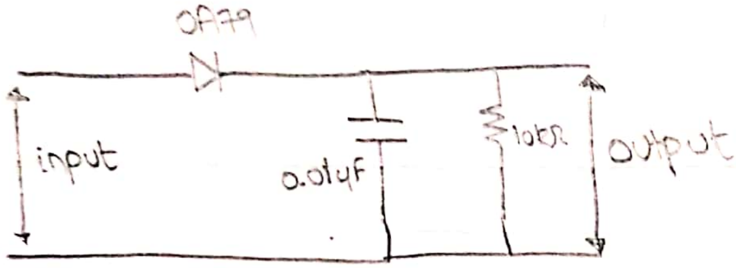
1) Connect the AM as input to the detector.
2) Use oscilloscope to look at the input to the envelope detector. Adjust the modulation.
3) Look at the output of the envelope detector.
4) Corresponding readings are noted.

Calculation

$$m = \frac{460}{940} = 0.49 \approx 0.5 \Rightarrow 50\%$$

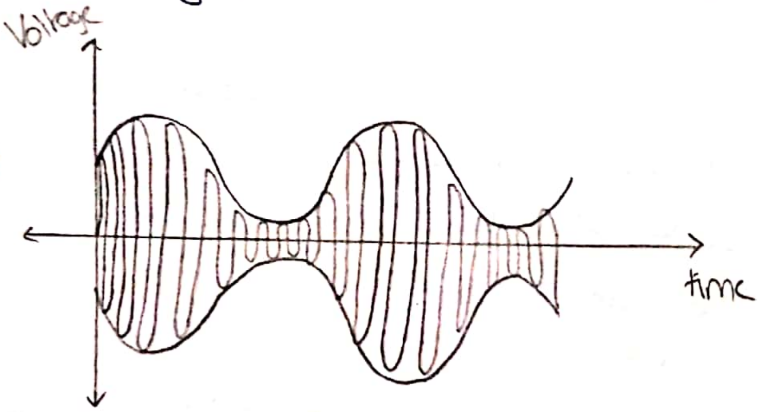
Teacher's Signature : ____________

Circuit diagram



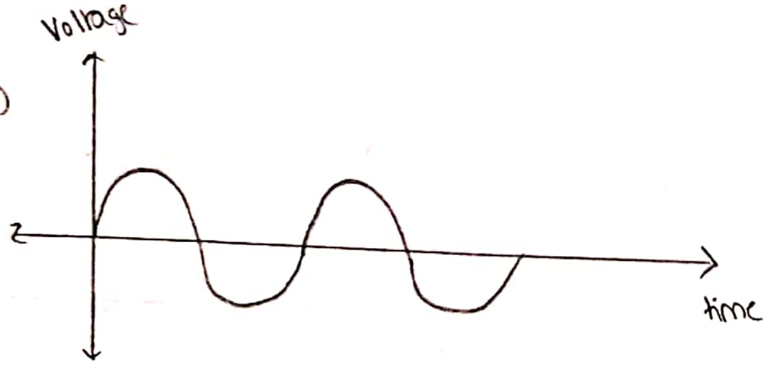
Model graph

(i)



AM input

(ii)



Message output

Date

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Inference

Based on RC time constant value, envelope reproduction may vary. Hence, RC value must be chosen properly for exact reproduction of message signal.

Theory

Process of detection provides a means of recovering the modulation signal. De-modulation is the reverse process of modulation. The envelope detector circuit is employed to seperate the carrier wave and eliminate the side bands.

Since envelope of an AM wave has the same shape as the message, independent of carrier frequency and phase, demodulation can be achieved by extracting envelope.

An increased time constant results in marginal output follows the modulation envelope.

The depth of modulation at the detector output greater than the unity and circuit impedance is less than the circuit load resulting in clipping of negative peaks of modulated signal

Result:

Original signal (message) was detected from AM signal using envelope detector.

Teacher's Signature :

Tabulation

AM input signal		Message signal
Vmax	Vmin	Peak Voltage
0.7V	240mV.	2.55 Vp.

Design

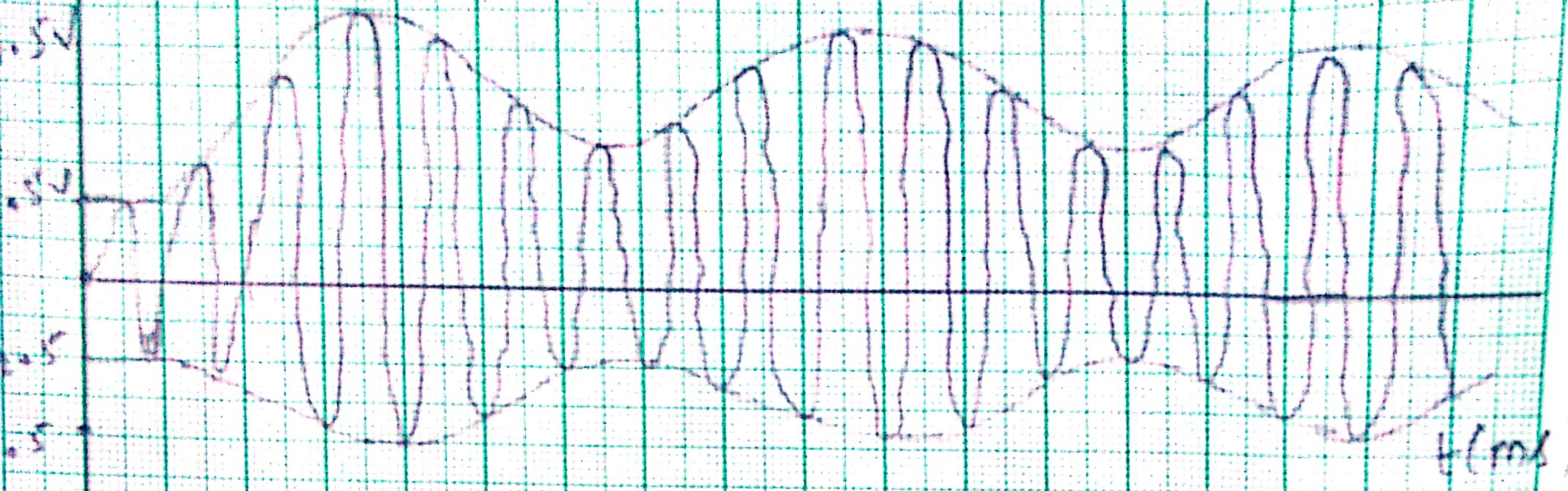
Design a low pass filter for modulating $f_m = 100\,\mathrm{KHz}$; $f_c = 100\,\mathrm{KHz}$

$$f_m = \frac{1}{2RC\pi}$$

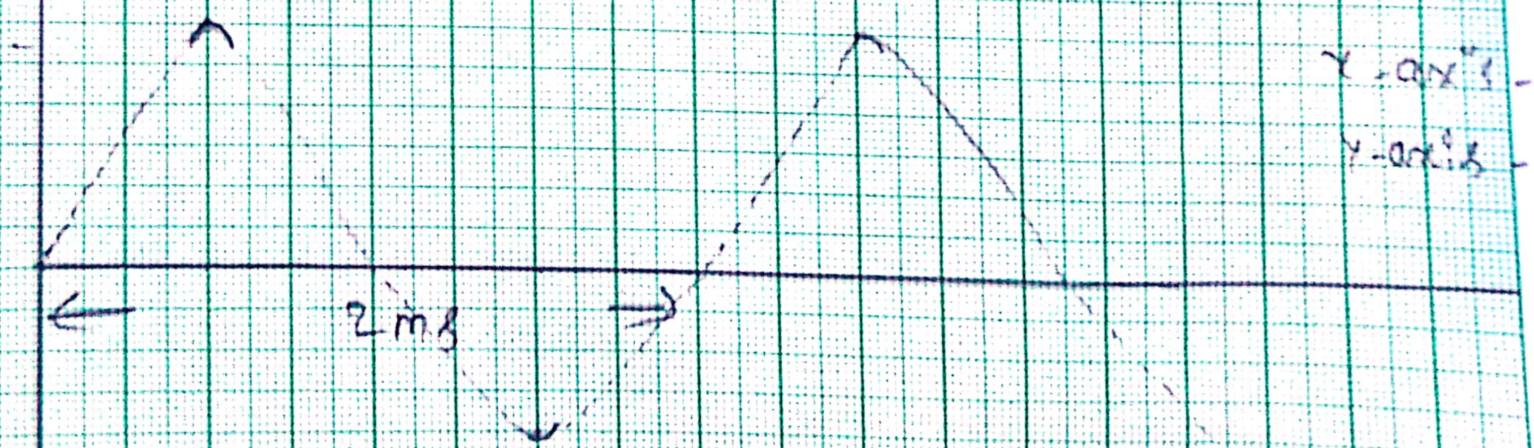
$$\Rightarrow R = \frac{1}{2(3.14)(0.01)(100)} = 0.15923 \times 10^{2}$$

$$= 15.92\,\mathrm{K}\Omega$$

Amplitude De-modulation



X-axis 1cm
Y-axis 1V



X-axis
Y-axis

```
Fsig=10;                        Fc=100;
t = 0:1/Fsamp:2*pi;

Tx = cos(2.*pi.*Fsig.*t);                       % T
Carrier = cos(600.*t);                          % C
Modulated = Tx.*Carrier;                        % M
Demodulated = Modulated.*Carrier;               % D

Rx= filter([1 1],[1 -0.8],Demodulated);

figure(6);
plot(t,Tx,'r',t,Modulated,'b',t,Demodulated
legend('Trans.','Modulated','Demodulated',
```

```
Fsamp=10.*Fc;

% Transmitted Signal
% Carrier Signal
% Modulated Signal
% Demodulated Signal

ted,'g',t,Rx,'k','LineWidth',1.5); grid on;
,'Baseband')
```