Agnel Charities'

Fr. C. RODRIGUES INSTITUTE OF TECHNOLOGY

DEPARTMENT: Electronics and Telecommunication Engineering.

LABORATORY CONTINUOUS ASSESSMENT FORMAT

First / ~~Second~~ Half of 2022

Course Name: Principles of Communication Engineering Lab (ECL403

Name of the Teacher: Prof. Sadhana Pai

Name of the Student: Rishi Raturi

Roll No: 3020148	**Semester: IV**
Batch: 2nd	**Practical No: 2**
Date of Practical: 25-01-2022	**Date of Report Submission: 04-02-2022**

Title: Amplitude modulation

Course Outcome: Perform an experiment to design circuits and demonstrate amplitude modulation and demodulation

ASSESSMENT

Sr. No.	Parameter for Assessment	Marks	Rubrics		
1.	**Practical Performance / Active Participation (03Marks)**		Above Average (03)	Average (02)	Below Average (01)
2.	**Report Presentation (02 Marks)**		Above Average (02)	Average (01)	Below Average (00)
3.	**Understanding (03 Marks)**		Above Average (03)	Average (02)	Below Average (01)
4.	**Regularity in Submission (02 Marks)**		Timely (02)	Late (01) (≤ 2 Weeks from the date of Practical)	Very Late (00) (> 2 Weeks from the date of Practical)

Total Marks (10):

Teacher's Signature: **Date:**

Fr.C.Rodrigues Institute of Technology, Vashi Dept. of Electronics and Telecommunication Engineering. IV SEM
EXTC
SUB: Principles of Communication Engg. Lab

AM DETECTION

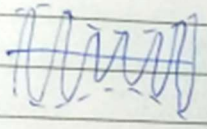
Expt No.	2	**Date: 25-01-2022**
AIM	To Simulate amplitude demodulation using diode	
SOFTWARE TOOL	LTSpice software	
THEORY	Write about: Working of the circuit used.	

Date 04/02/2022

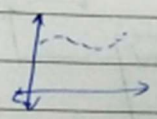
Theory

1. Amplitude Detection:

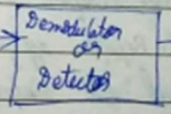
(1) The process of Amplitude detection is also called as Amplitude 'Demodula
(2) Demodulation is exactly the opposite process of modulation.
(3) The original modulating signal is recovered back from the Am signal by the process of detection.
(4) Thus the process of detection or demodulation is the process of r the message signal from the received modulated signal



Am wave



original message signal.

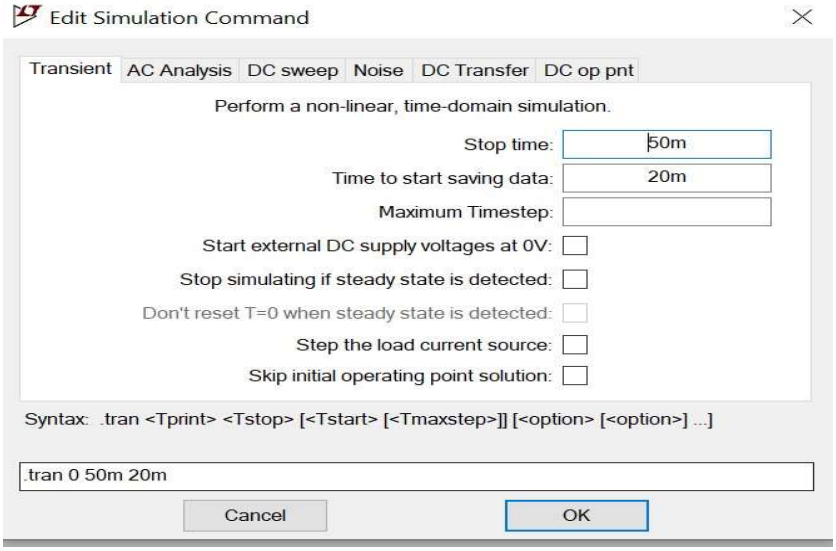


There are two types

(1) Square law detector
(2) Envelope detector.

Working of circuit:

- Here out circuit consist of differential amplifier. Here this is provided with modula signal of 3V amplitude. And frequency of 1kHz is given and superimposed t the carrier signal of amplitude 1V and frequency of 100kHz.
- The output of op Amp is connected to RLC circuit which acts as a
- This filters out the unwanted signal and expected o/p (Am signal) obtained.
- After that, AM signal is sent as i/p to envelope a detector consist of an ideal diode, a capacitor and a resistor
- The detected signal o/p is obtained at 'resistor and

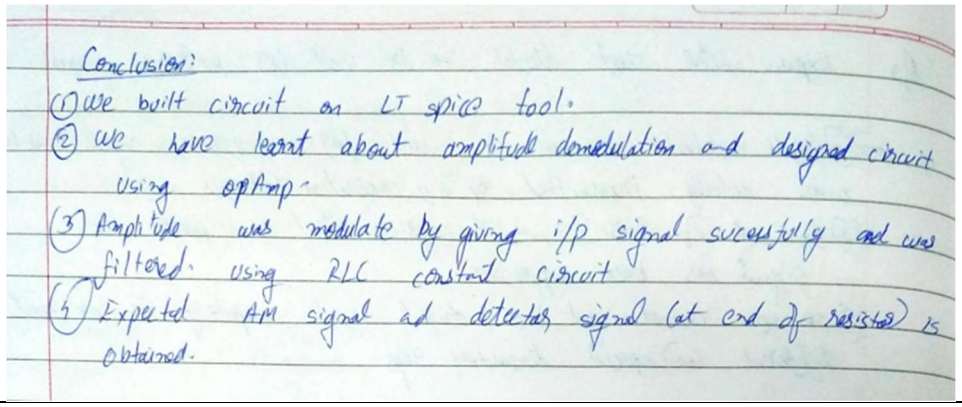
PROCEDURE	1. Click on 'File' on menu bar and click on 'New Schematic' to get schematic window. 2. For AM generation use the circuit tested in Expt No. 1 3. Get the components and place them as shown in the given circuit diagram. 4. Connect the components using 'wire' tool. 5. Connect the output of the AM generator as input to the envelop detector. 6. Simulate using  Run. Following window appears. Click on 'Transient' and set the values as shown. 
	7. Click on 'Run' again. Wait till the output window appears. 8. Observe AM signal and diode detector output signal FFT of demodulated signal. 9. Vary the input and note down Detector output 10. Vary the time constant (0.05 m sec, 0.1 m. sec, 1 m.sec amd 10 m. sec and comment on detector output.

Observation table

Vm (input)	Detector Output
1	34.77
2	86.28
3	145.54
4	179.89

Vm (input)	Time Constant (Rd. Cd)	Detector Output (describe the ripple)
3m	0.1ms	10.4
3m	1ms	0.307
3m	10ms	0.046

Conclusion



Answer the following Questions.

1. Explain the reason for choppy detector output signal.
2. What happens if RC time constant of detector is too large?
3. Explain whether Diode detector can be used for AM-DSB SC signal

Answer the following

Q1 Explain the reason of choppy detector O/p signal.

→ (1) Detector signal consist of an ideal diode, capacitor and resistor.

(2) If i/p signal is the +ve then the ideal diode is in forward bias, capacitor begins to charge charge upto its peak value and when reaches to peak, AM signal becomes negative. Here diode will be act as open circuit cause of reverse biased mode.

(3) If R_L is smaller, the capacitor discharges faster through resistor and hence we get choppy detector o/p signal.

(3) ideal condition of it is $\frac{1}{f_c} << R_L << \frac{1}{f_m}$

f_m = max modulating freq.

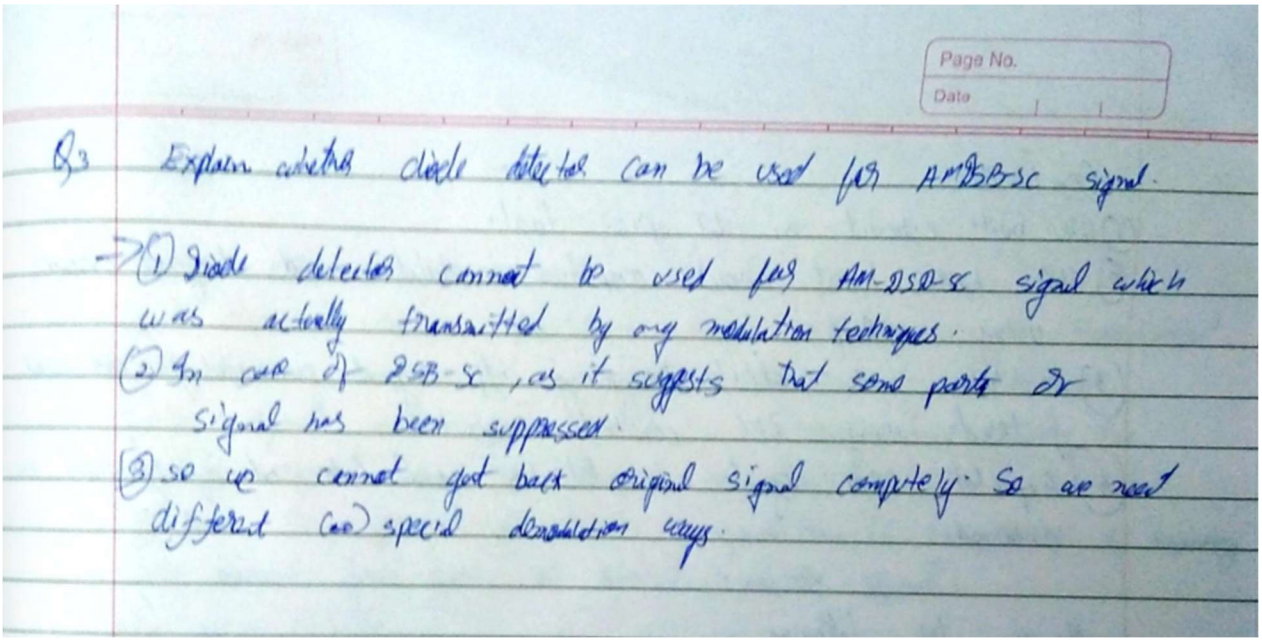
Q2 What happens if RC time constant of detectors is too large?

→ (1) The capacitor charges through diode and internal resistance R_s when diode is on and discharges through R when the diode is off

(2) The charging time constant R_sC should be short as compared to the carrier period $\frac{1}{f_c}$ $R_sC << \frac{1}{f_c}$

(3) Discharging time constant R_L should be long enough so that the capacitor discharge slowly through load resistance R

(5) But time const should be too long which will not allow the capacitor voltage to discharge at the max rate of change of the envelope $\therefore \frac{1}{f_c} << R_L C << \frac{1}{f_m}$.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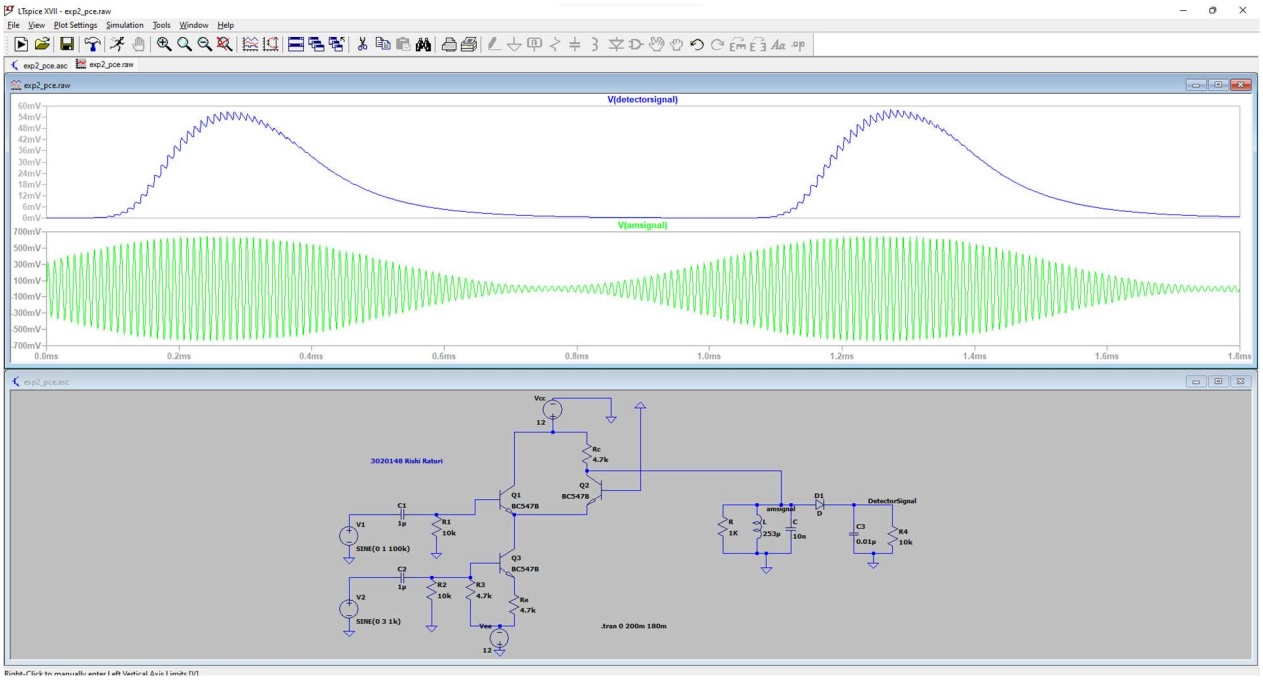
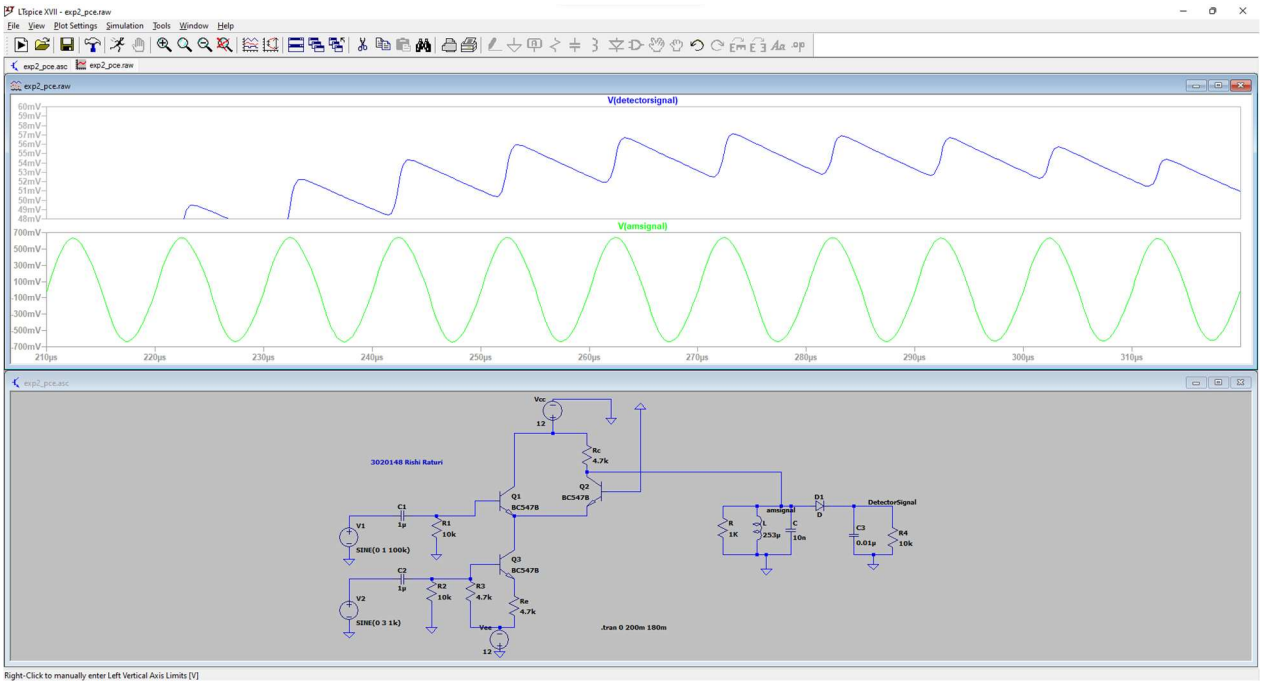
Date
Q3 Explain whether diode detector can be used for AM DSB-SC signal.
(1) Diode detector cannot be used for AM-DSB-SC signal which was actually transmitted by any modulation techniques.
(2) In case of DSB-SC, as it suggests that some parts of signal has been suppressed.
(3) so we cannot get back original signal completely. So we need different (or) special demodulation ways.

Results:


LTspice XVII - exp2_pce.raw
File View Plot Settings Simulation Tools Window Help
exp2_pce.asc exp2_pce.raw
V(detectorsignal)
V(amsignal)
0.0ms 0.2ms 0.4ms 0.6ms 0.8ms 1.0ms 1.2ms 1.4ms 1.6ms 1.8ms
3020148 Rishi Raturi
Vcc
12
Rc
4.7k
Q1
BC547B
Q2
BC547B
Q3
BC547B
C1
1µ
R1
10k
V1
SINE(0 1 100k)
C2
1µ
R2
10k
R3
4.7k
Re
4.7k
V2
SINE(0 3 1k)
Vee
12
amsignal
R
1K
L
253µ
C
10m
D1
D
DetectorSignal
C3
0.01µ
R4
10k
.tran 0 200m 180m



Circuit Diagram: