



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)  
Dundigal, Hyderabad - 500 043

## LABORATORY WORK SHEET

Date: 12-04-2022

Roll No. 2095110494 Name: Mohammed Johari  
Exp No.: 03 Experiment Name: Single tuned amplifier

### DAY TO DAY EVALUATION:

| Preparation | Algorithm              | Source Code             | Program Execution          | Viva | Total |
|-------------|------------------------|-------------------------|----------------------------|------|-------|
|             | Performance in the Lab | Calculations and Graphs | Results and Error Analysis |      |       |
| Max. Marks  | 4                      | 4                       | 4                          | 4    | 20    |
| Obtained    | 4                      | 4                       | 4                          | 4    | 20    |



Signature of Lab I/C

### START WRITING FROM HERE:-

#### Aim:-

1. Determine practical frequency of single tuned amplifier
2. Draw frequency response & compare it with theoretical frequency.
3. Determine maximum gain and bandwidth using bode plotter.

#### Equipment needed:-

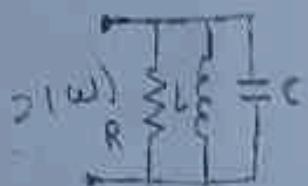
1. Analog Discovery
2. Instrument
3. Personal Computer
4. Trainer Kit
5. Connecting Wires

#### Software Requirements

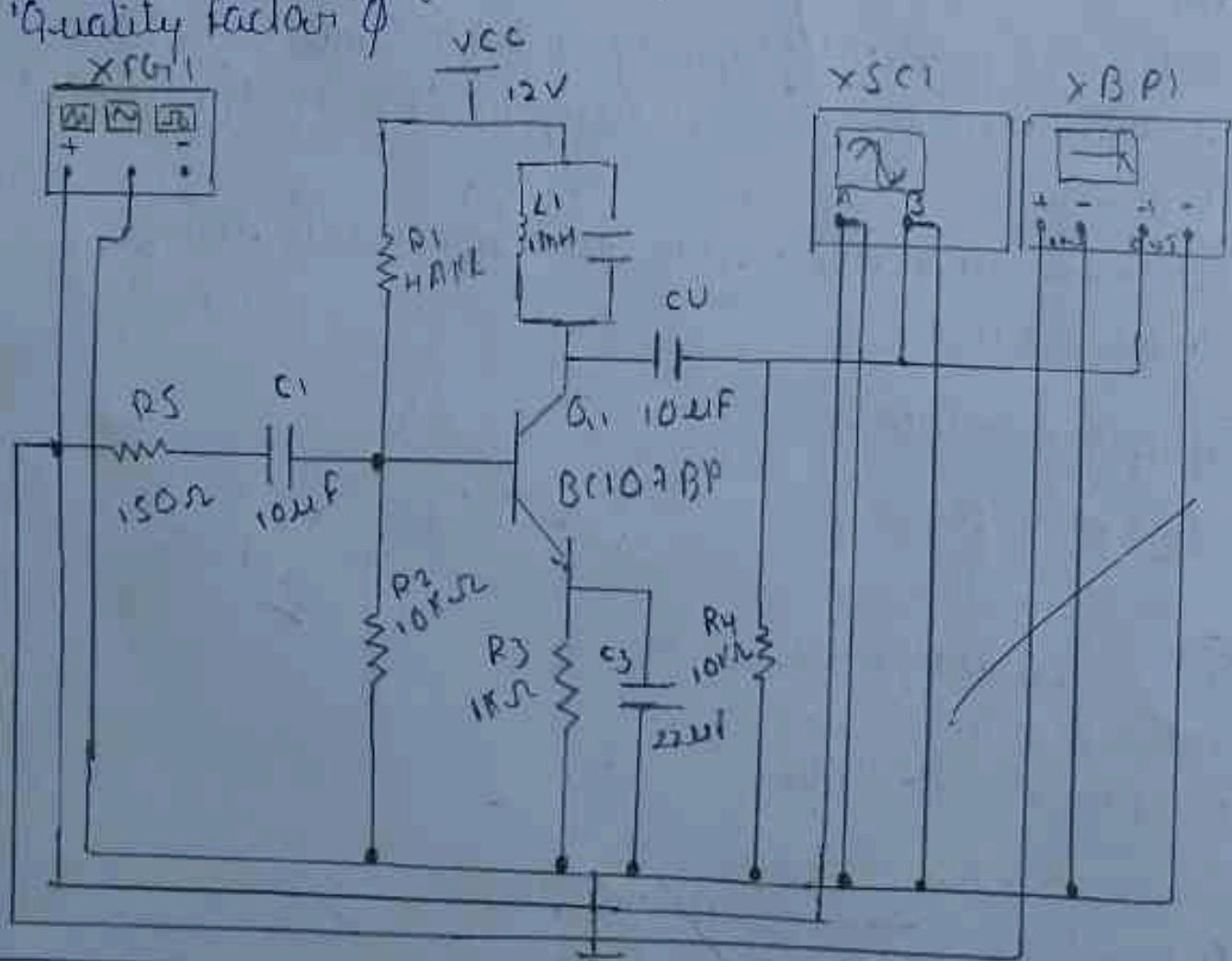
1. Multisim software 14.0 edition
2. Waveform generator software

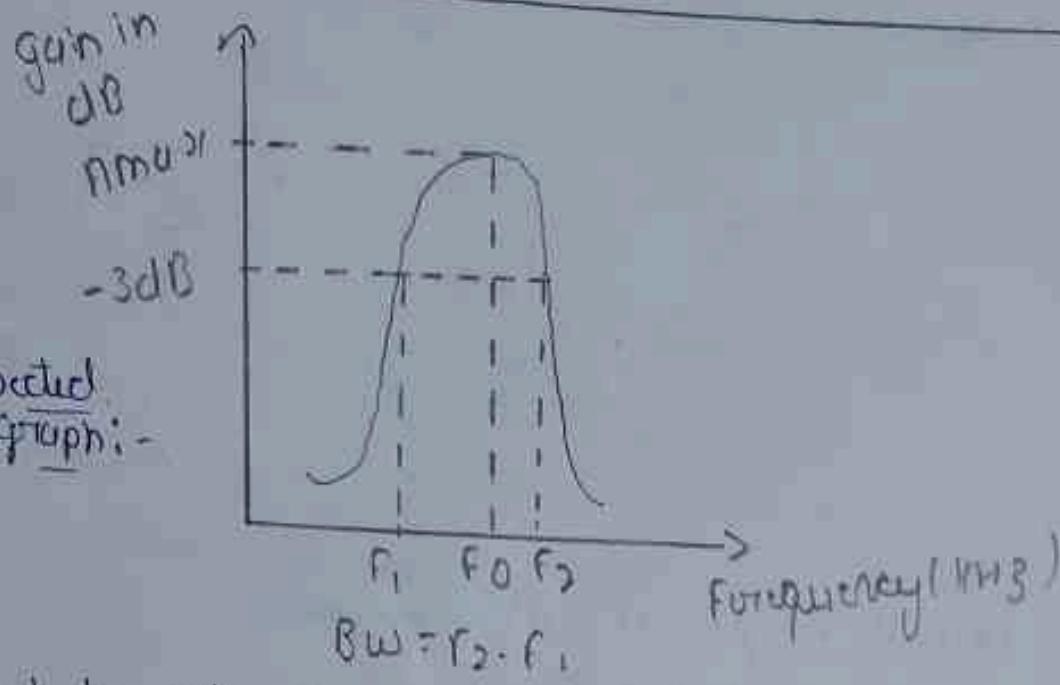
Theory:-

Tuned amplifiers are amplifiers involving a resonant circuit and are intended for selective amplification with a narrow band of frequencies. Radio and TV amplifiers employ tuned amplifier to select one broadcast channel from among the many concurrently involved in an antenna transmitted through a cable.



A modest algebraic treatment in convenient form also is shown. The significance of their definition of the 'Quality factor'  $Q$





Expected Graph:-

Vibrating column:-

| Frequency (kHz) | Grain (dm)<br>$20 \log \left( \frac{v_o}{v_i} \right)$ | Frequency (kHz) | Grain (dm)<br>$20 \log \left( \frac{v_o}{v_i} \right)$ |
|-----------------|--|-----------------|--|
| 10 kHz          | 10.823   | 10 kHz          | 11.246   |
| 15 kHz          | 15.449   | 15 kHz          | 16.574   |
| 20 kHz          | 19.768   | 20 kHz          | 20.456   |
| 25 kHz          | 24.744   | 25 kHz          | 25.542   |
| 30 kHz          | 32.804   | 25 kHz          | 32.627   |
| 32 kHz          | 39.267   | 27.705 kHz      | 50.364 dB  |
| 33.431 kHz      | 52.397 dB  | 29 kHz          | 39.574   |
| 35 kHz          | 44.429   | 30 kHz          | 34.878   |
| 37 kHz          | 35.8   | 35 kHz          | 25.404   |
| 40 kHz          | 30.237   | 40 kHz          | 21.364   |
| 45 kHz          | 25.482   | 45 kHz          | 18.811   |
| 50 kHz          | 22.633   | 50 kHz          | 16.943   |

calculations :-

$$\begin{aligned}
 \text{Bandwidth} &= f_H - f_L \\
 &= 32.21 \text{ kHz} - 33.21 \text{ kHz} \\
 &= 1 \text{ kHz}
 \end{aligned}$$

$$C = 0.022 \mu F \rightarrow f = \frac{1}{2\pi\sqrt{LC}} = \frac{1}{2\pi\sqrt{1 \times 10^{-3} \times 0.022 \times 10^{-6}}} = 33431.4479 \text{ Hz}$$

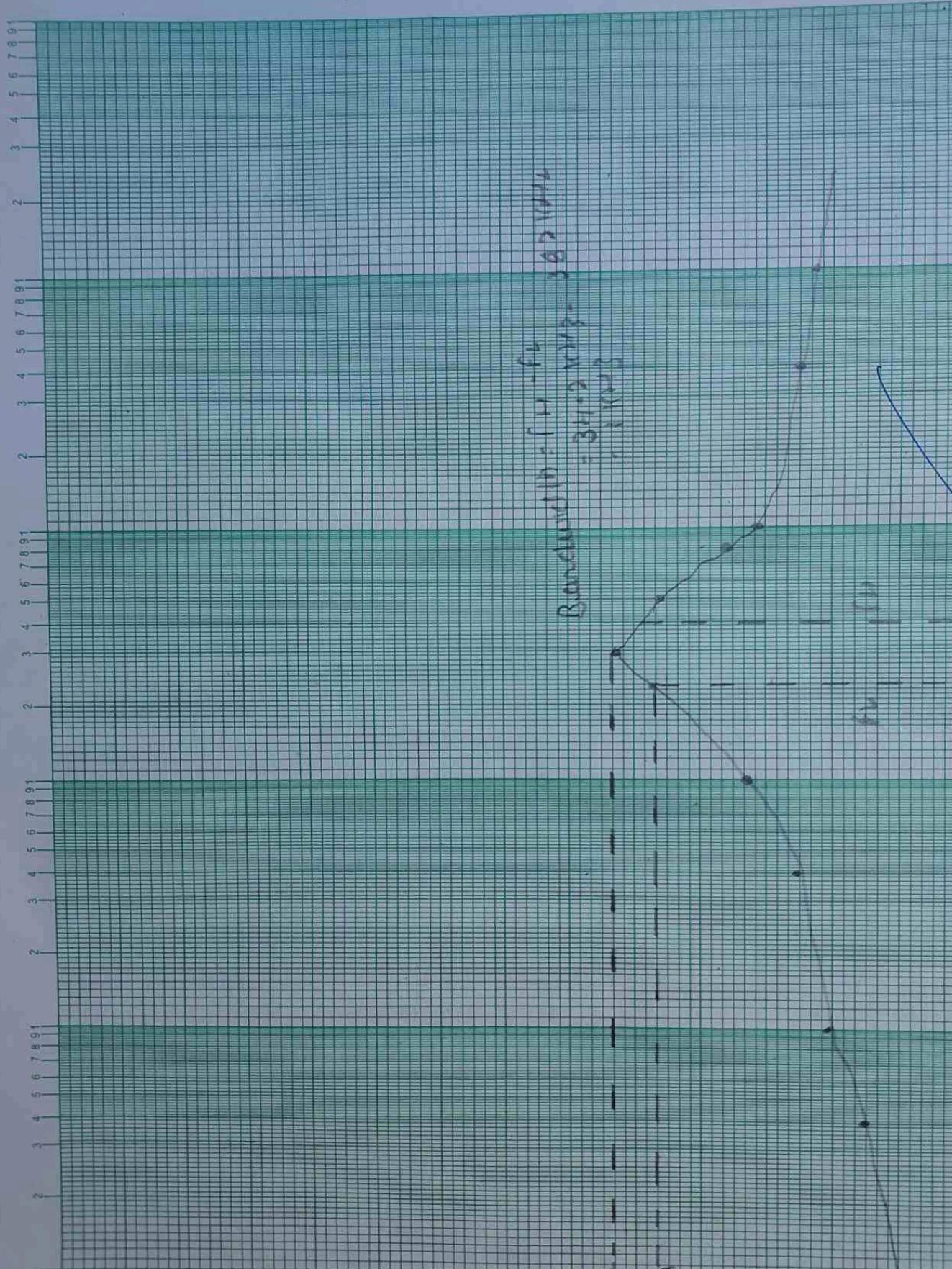
$$C = 0.033 \mu F \rightarrow f = \frac{1}{2\pi\sqrt{LC}} = \frac{1}{2\pi\sqrt{1 \times 10^{-3} \times 0.033 \times 10^{-6}}} = 27703.3146 \text{ Hz}$$

Procedure :-

- connect the circuit as per circuit diagram.
- connect the  $0.022 \mu F$  capacitor.
- Adjust input signal amplitude in the function generator and observe an amplified at the output without distortion.
- By keeping input signal voltage at 50mV, vary the input signal frequency from 0-200 Hz as in tabular column and note the corresponding output voltage.
- Repeat the same procedure for  $0.033 \mu F$  capacitor.
- calculate the  $f_1, f_2$  and bandwidth.
- compare the resonant frequency with theoretical values in both cases.

Result:-

observed the frequency response of single tuned amplifier.



SEMI-LOG PAPER (5 CYCLES X 1/10)

$10 \times 10^3$

$20 \times 10^3$

$30 \text{ kHz}$        $33.2 \text{ kHz}$        $34.2 \text{ kHz}$   
 $40 \text{ kHz}$        $50 \text{ kHz}$        $60 \text{ kHz}$   
 $10 \times 10^3$        $20 \times 10^3$        $30 \text{ kHz}$   
 $40 \text{ kHz}$        $50 \text{ kHz}$        $60 \text{ kHz}$

Date :

01/06/08



Name : Akash D. Doshi Date : 09/06/08

U.C.K.-3 CPC