



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad - 500 043

LABORATORY WORK SHEET

Date: 12.06.2022

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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	4	20
Obtained	4	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

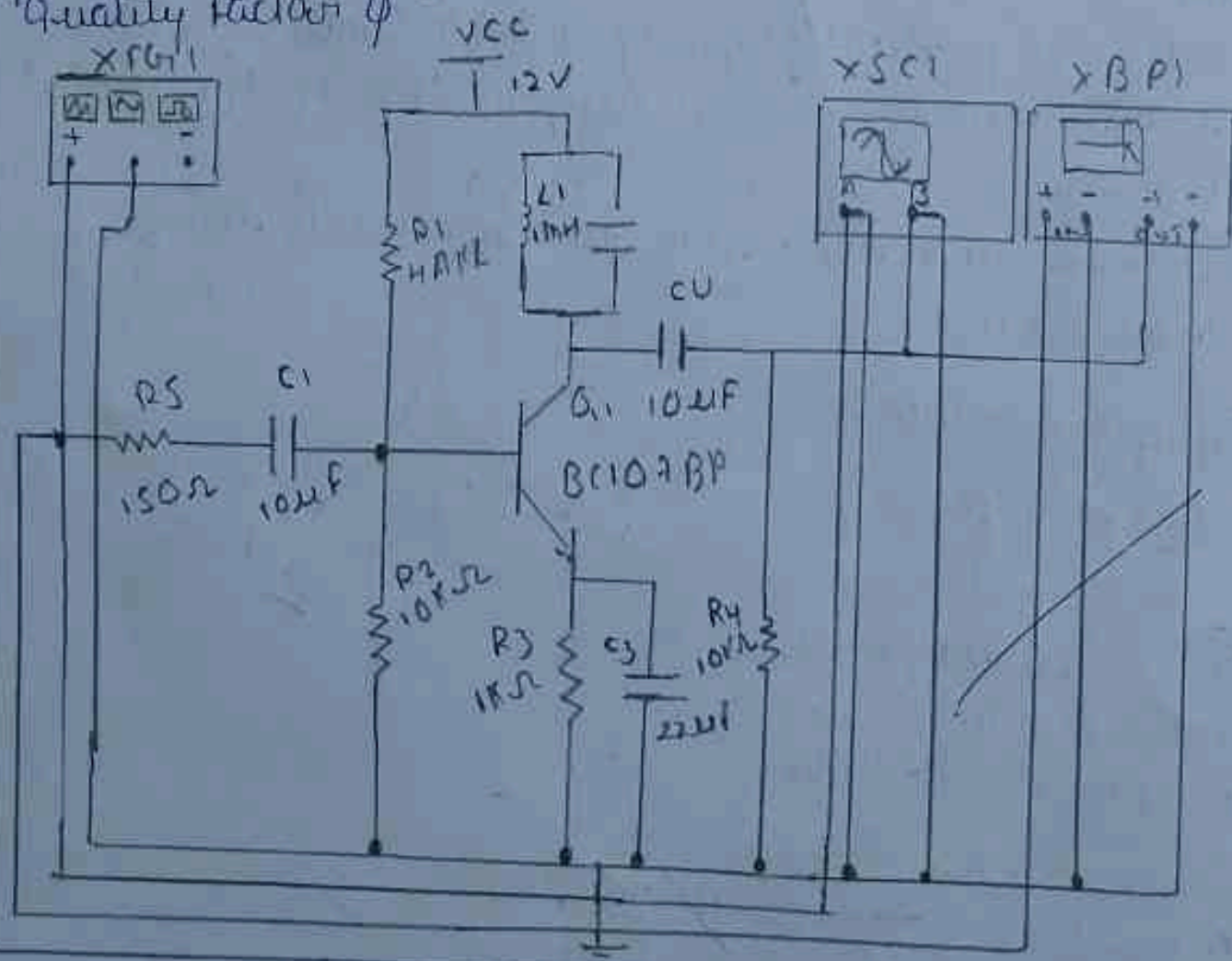
1. Multisim software 14.0 edition
2. Waveform generator software

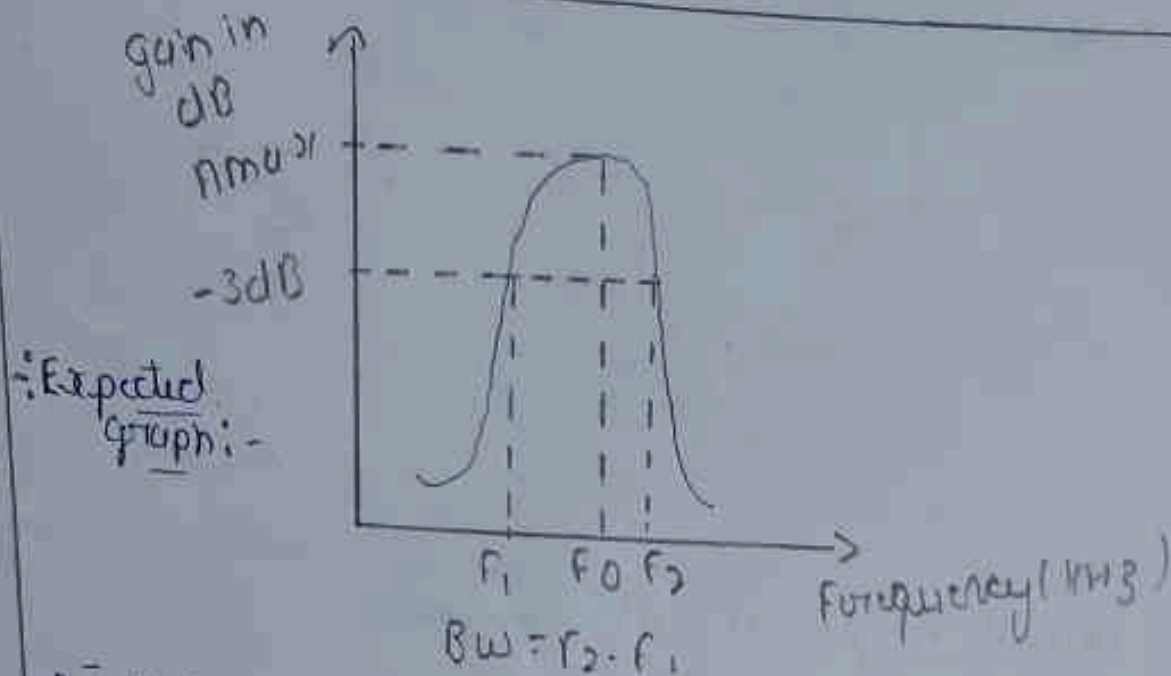
Theory:-

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 constantly involved in an antenna transmitted through a cable.



A model algebraic representation in convenient form also is shown. The significance of their definition of the 'Quality factor' Q





Tabular column:-

$C = 0.022 \mu f$, $V_{in} = 50mV$		$C = 0.033 \mu f$, $V_{in} = 50mV$	
Frequency (kHz)	Gain (dB) $20 \log \left(\frac{V_o}{V_i} \right)$	Frequency (kHz)	Gain (dB) $20 \log \left(\frac{V_o}{V_i} \right)$
10 kHz	10.823	10 kHz	11.246
15 kHz	15.449	15 kHz	16.574
20 kHz	19.768	20 kHz	22.456
25 kHz	24.749	22 kHz	25.542
30 kHz	32.806	25 kHz	32.625
32 kHz	39.267	27.705 kHz	50.364 dB
33.431 kHz	52.387 dB	29 kHz	39.574
35 kHz	44.429	30 kHz	34.828
37 kHz	35.8	35 kHz	25.404
40 kHz	30.237	40 kHz	21.364
45 kHz	25.483	45 kHz	18.811
50 kHz	22.633	50 kHz	16.943

calculations:-

$$\begin{aligned}
 \text{Bandwidth} &= F_H - F_L \\
 &= 32.2 \text{ kHz} - 33.2 \text{ kHz} \\
 &= 1 \text{ kHz}
 \end{aligned}$$

$$C = 0.022 \mu F \rightarrow f = \frac{1}{2\pi\sqrt{LC}} = \frac{1}{2\pi\sqrt{1 \times 10^{-3} \times 0.022 \times 10^{-6}}} = 33431.4479 = 33.431 \text{ kHz}$$

$$C = 0.033 \mu F \rightarrow f = \frac{1}{2\pi\sqrt{LC}} = \frac{1}{2\pi\sqrt{1 \times 10^{-3} \times 0.033 \times 10^{-6}}} = 27705.3196 = 27.705 \text{ kHz}$$

Procedure:-

- connect the circuit as per circuit diagram.
- connect the 0.022 μF 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 kHz as in tabular column and note the corresponding output voltage.
- Repeat the same procedure for 0.033 μF 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.

60 kHz

50 kHz

40 kHz

35 kHz

30 kHz

20 kHz

10 kHz

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

Week-3
GPC

Name: _____

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Bandwidth = $f_H - f_L$
= $34.5 \text{ kHz} - 30 \text{ kHz}$
= 4.5 kHz

