

Aditya Pathak, 102115044

2NC2

Analog Tute 7

Page No.

DATE: / /

Q₁

$$\text{Total gain} = 40 \times 50 \times 60$$
$$= 12 \times 10^4$$

$$\begin{aligned}\text{Total gain in dB} &= 20(\log_{10}(40) + \log_{10}(50) + \log_{10}(60)) \\ &= 20(1.602 + 1.699 + 1.778) \\ &= 101.58 \text{ dB}\end{aligned}$$

Q₂

$$f_1' = \frac{1}{\sqrt{2^{1/n} - 1}} f_1$$

$$f_2' = \sqrt{2^{1/n} - 1} f_2$$

$$\frac{A_{V_c}}{A_{V_m}} = \frac{1}{\sqrt{1 + \frac{f_1^2}{f^2}}}$$

Q₃

$$f_1' = \frac{64}{\sqrt{2^{1/2} - 1}} = 39.44 \text{ Hz}$$

$$f_2' = \sqrt{2^{1/2} - 1} (10) = 6.43 \text{ kHz}$$

$$Q5. \quad Z_i = R_1 \parallel R_2 \parallel R_{ie}$$

$$R_1 \parallel R_2 = \frac{47(10)}{57} = 8.246 \text{ k}\Omega$$

$$8.246 \text{ k}\Omega \parallel R_{ie} = \frac{(8.246)(2.2)}{10.446}$$

$$Z_i = 1.737 \text{ k}\Omega$$

$$Z_o = \frac{1}{\beta_{oe}} = 4 \text{ k}\Omega$$

$$Z_{os} = Z_o \parallel R_c = \frac{4(4.7)}{8.7} = 2.16 \text{ k}\Omega$$

volt gain of Ist stage

$$A_i = - \frac{\beta_{fe}}{\beta_{ie}} \times R_{ac}$$

$$= - \frac{4.7(R_5 \parallel R_3 \parallel R_6 \parallel R_{ie})}{2.2}$$

$$R_{ac1} = R_3 \parallel 1.737 \text{ k}\Omega$$

$$= \frac{(4.7)(1.737)}{6.437} = 1.27 \text{ k}\Omega$$

$$A_i = - \frac{4.7 \times 1.27}{2.2} = -2.71 \text{ k}\Omega$$

volt gain of IInd stage $A_2 = - \frac{4.7}{2.2} \times 2.16 = -4.61 \text{ k}\Omega$

overall gain (A) = 12.5 k

$$Q6 \quad 25 = 10 \log_{10} \left(\frac{P_o}{10} \right)$$

$$10^{2.5} = \frac{P_o}{10^{-2}}$$

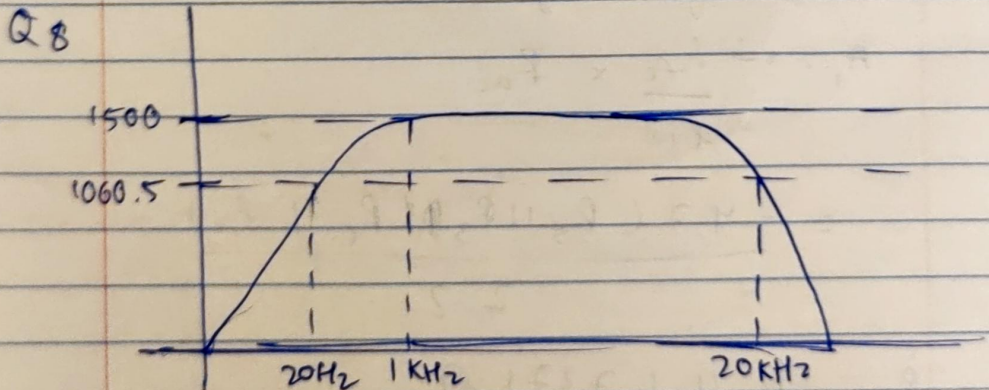
$$P_o = 10^{0.5} = 3.16 \text{ W}$$

$$Q7 \quad A_{v_1} = \frac{-50}{1.1} (4 \parallel 10 \parallel 2 \parallel 1.1)$$

$$= -25.85$$

$$A_{v_2} = \frac{-50}{1.1} (2 \parallel 10) = -75.91$$

$$\text{Overall gain} = \underline{1962.27}$$



$$1060.5 = 70.7\% \text{ of } 1500$$

$$\therefore \text{Lower cutoff freq.} = 20 \text{ Hz}$$

$$\text{Higher cutoff freq.} = 20 \text{ kHz}$$

$$f_2 - f_1 = 20 \text{ k} - 20 = 19.8 \text{ k}$$