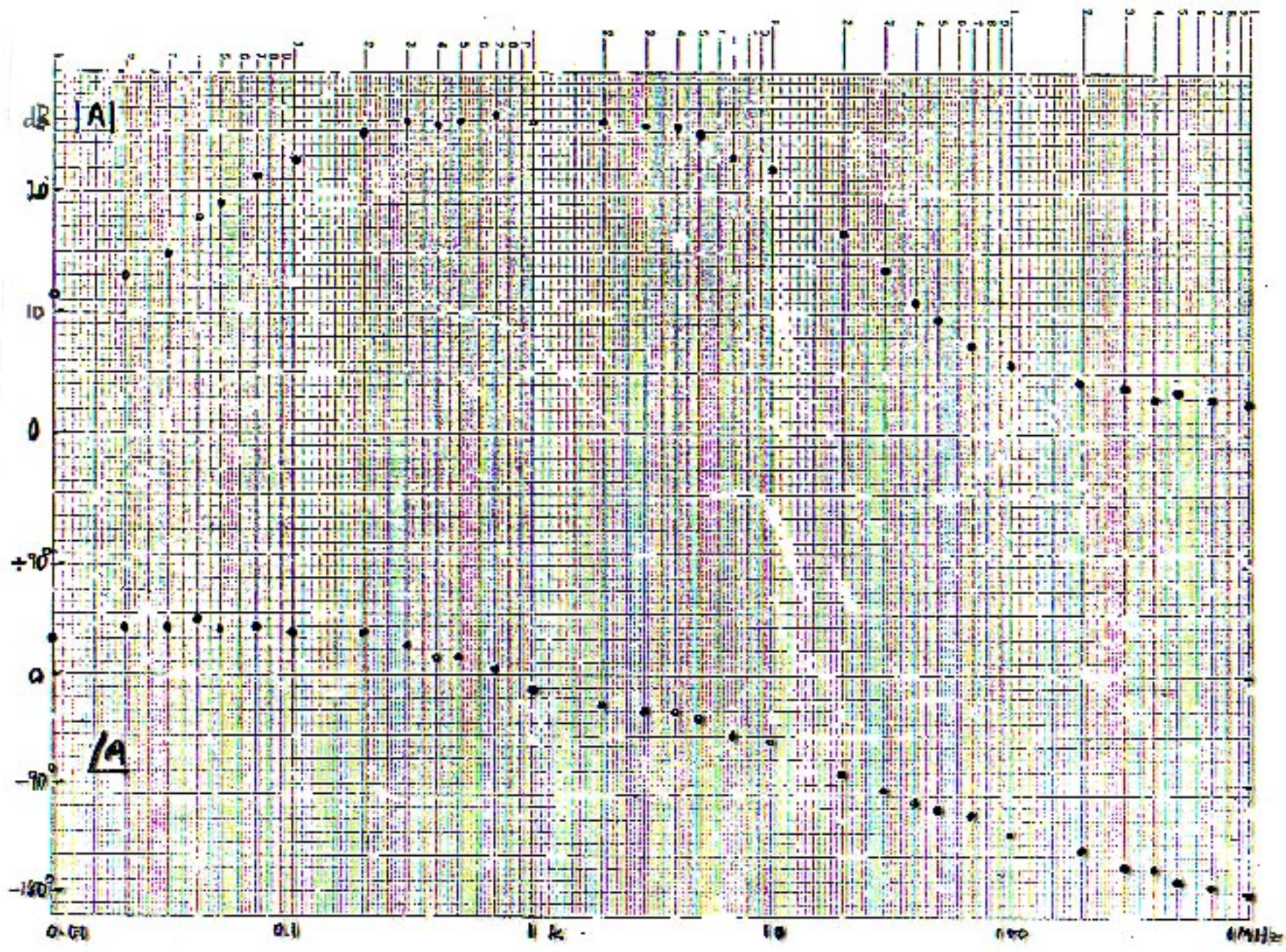


# 4

**FINDING FACTORED POLE-ZERO  
FORMS BY EYEBALL**

### Exercise

The accompanying graph shows experimental magnitude data for a certain gain function  $A(s)$ . Draw appropriate straight-line asymptotes through the data points and hence deduce numerical values for the mid frequency gain  $A_m$  and for the poles and zeros in the corresponding analytic expression for  $A(s)$ .



## Reduction of Experimental Magnitude and Phase Data.

Objective: To find the best values of the (small number) of values for the flat gains and corner frequencies in the factored pole-zero expression that fit the (large number) of data points.

Method: Draw the best straight-line asymptotes that fit the data points over limited frequency ranges, subject to the constraints:

1. Asymptote slopes must be zero or multiples of  $\pm 20\text{dB/dec}$  (magnitude) or  $\pm 45^\circ/\text{dec}$  (phase), unless there are resonances.
2. Corner frequencies determined from magnitude and phase must be the same.

Useful consideration: the phase data give a more accurate value of a nearby corner frequency than do the magnitude data.

