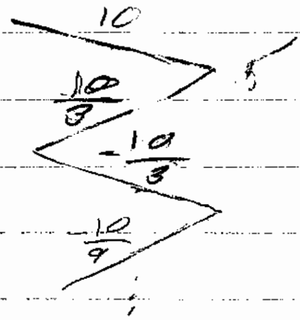
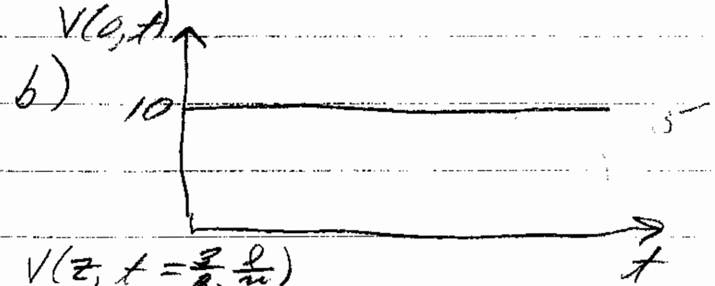
EE 333 Test 3 Solutions

(1998 test)

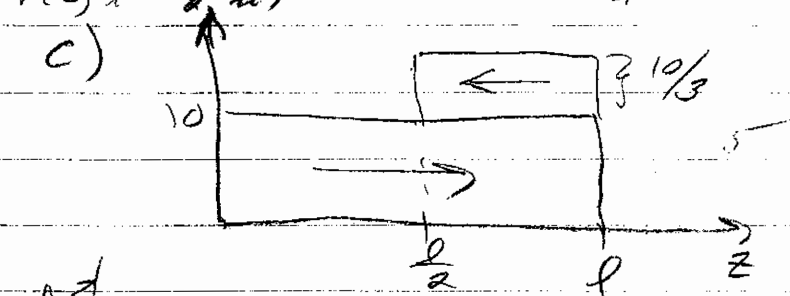
(15) 1. a) $V^+(z=0) = 10 U(t)$; $\Gamma(\ell) = \frac{100-50}{150} = \frac{1}{3}$; $\Gamma(0) = -1$



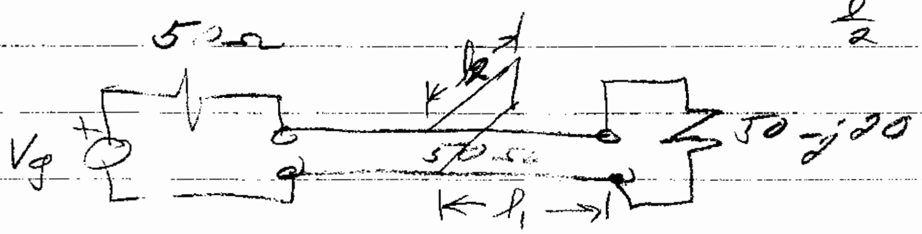
b)



c)



(15) 2.



a) $Z_n = 1 - j0.4$ from Smith Chart $|\Gamma| = 0.2$ 3

∴ % power reflected $= \boxed{0.2^2 \times 100 = 4\%}$ 2

b) from chart $\boxed{SWR = 1.5}$ 2

c) $\ell_1 = (0.140 - 0.109)\boxed{\lambda = 0.031\lambda}$ 5

$Y_{in@\,stub} = 1 + j0.4$ ∴ stub length $= (0.438 - 0.25)\lambda$

or $\boxed{\ell_2 = 0.188\lambda}$ 5

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(15) 4. $\hat{V}(0) = 0$ 3, $\hat{I}(0) = \frac{V_g}{Z_g}$ 3, $\hat{I}(\ell) = 0$ 3

$\hat{I}(0) = \frac{V_g}{Z_g} = \frac{\hat{V}_m^+}{Z_0}[1 - \Gamma(0)] = \frac{2\hat{V}_m^+}{Z_0}$ ∴ $\hat{V}_m^+ = \frac{Z_0 V_g}{2 Z_g}$

$\hat{V}(\ell) = \hat{V}^+ e^{-j\frac{2\pi}{\lambda}\cdot\frac{\lambda}{4}} 2 = -j\frac{Z_0 V_g}{Z_g}$ 3

(15) 3. $Z_{norm_{load}} = 1 + j1$

$\lambda = \frac{3\times10^8}{5\times10^7} = 6m$ $\therefore$ $\ell = \frac{1}{3}\lambda$ 5

$0.162 + 0.333 = 0.495$

a) $Z_{in_{norm}} = 0.38 - j0.023 \Rightarrow \boxed{Z_{in} = 19 - j1.15}$ 5

b) $P_{ave_{in}} = P_{ave_{load}}$

$\hat{I}_{in} = \frac{100}{29 - j1.15} = \frac{100}{29.02 e^{-j2.27°}}$

$\boxed{P_{ave_{load}} = \frac{1}{2}|\hat{I}_{in}|^2 19 = 112.8\ W}$ 5 problem 8

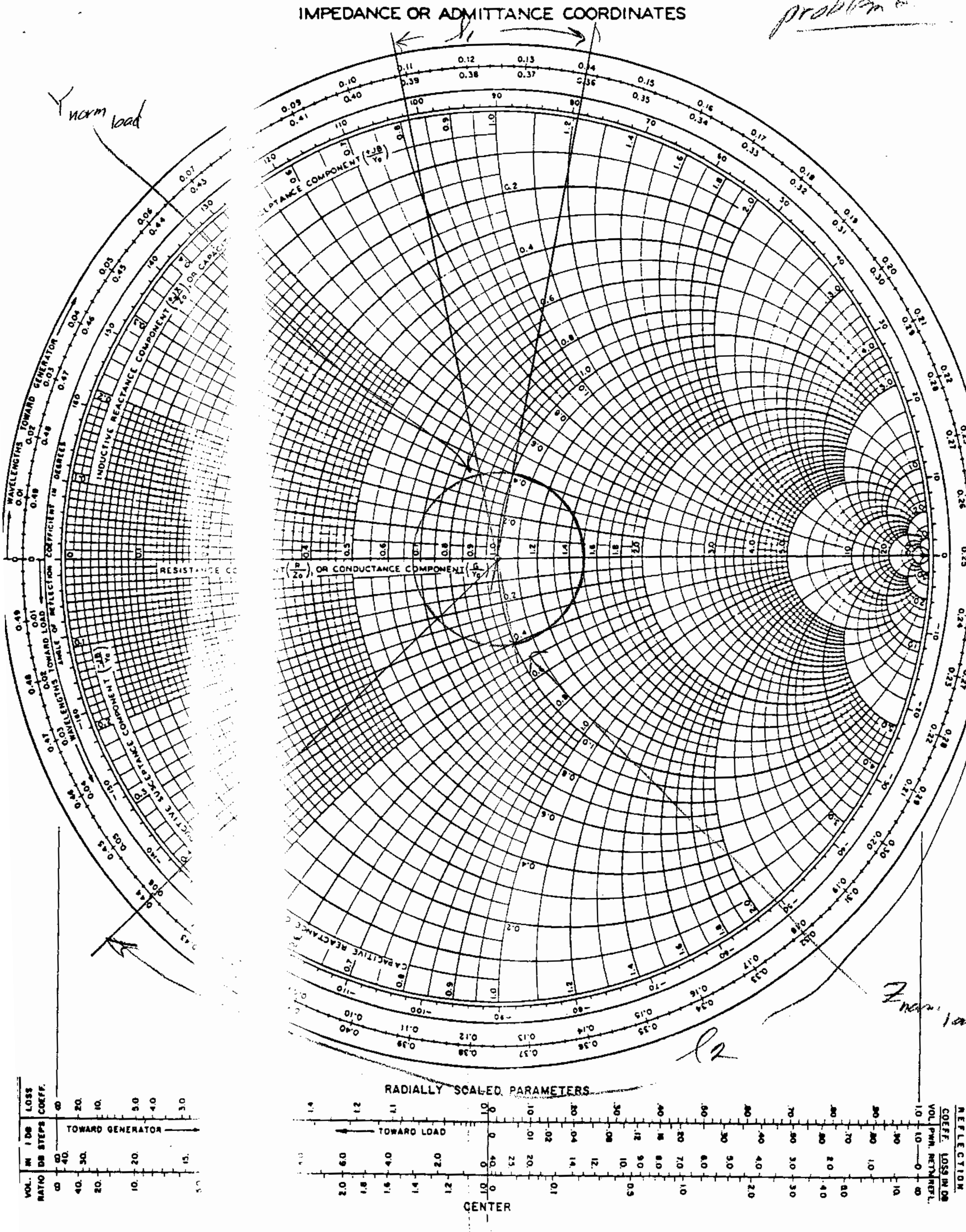

Fig. 9-3. A stand... ...ercially available form of Smith chart graph paper. Copyrighted 1949 by Kay... Company, Pine Brook, N. J., and reprinted with their permission.

IMPEDANCE OR ADMITTANCE COORDINATES

Problem 3

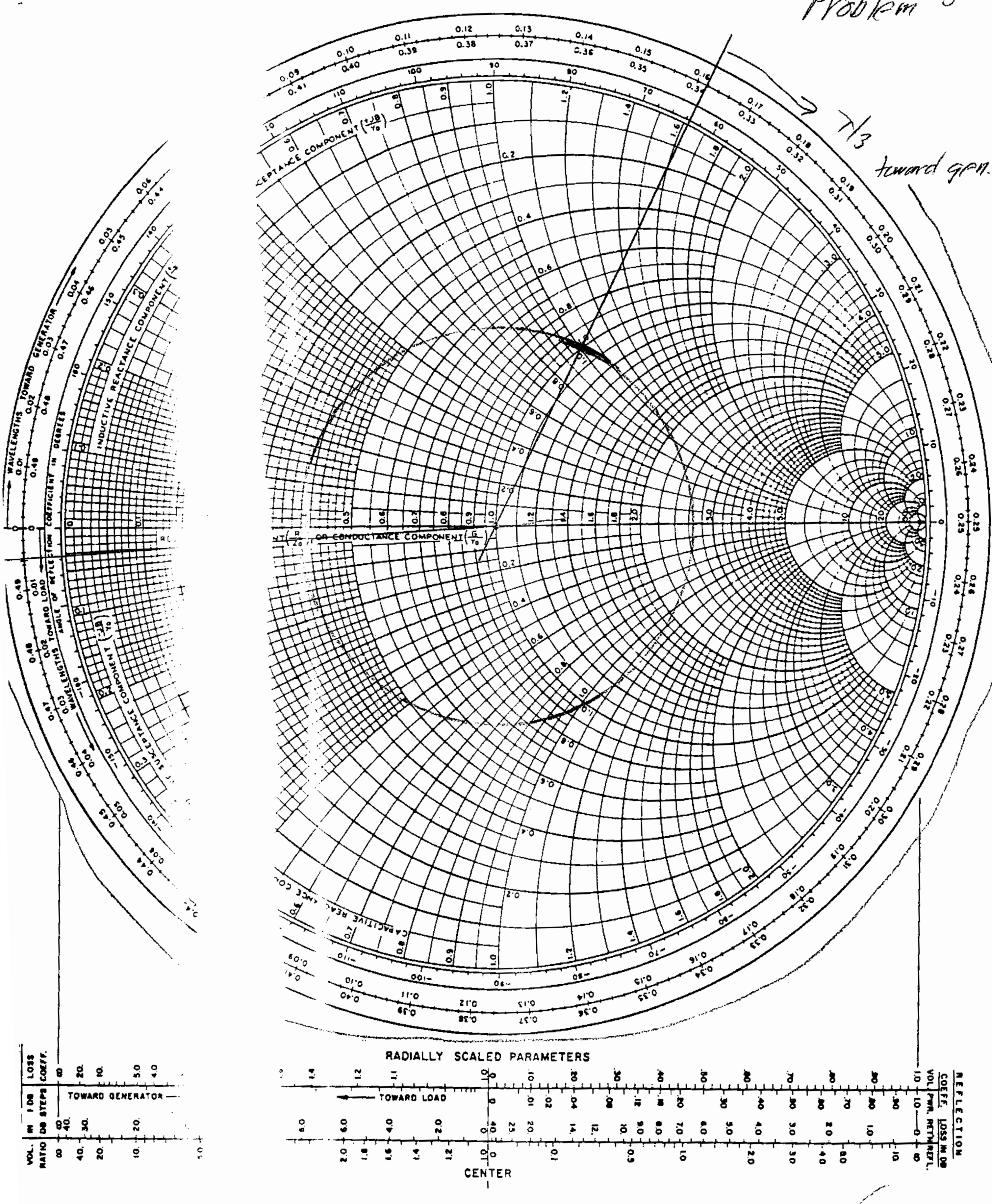

Fig. 9-3. A sta[illegible] [illegible]erc[illegible]lly available form of Smith chart graph paper. Copyrighted 1949 by K[illegible] Co[illegible]pany, Pine Brook, N. J., and reprinted with their permission.