Group Work 2   EMAG   Keegan

Find Γ, VSWR

A)

$$Z_{in} = \frac{Z_L}{Z_o} = \frac{50+30j}{50} *$$

$$z | Z_{in} = 1+0.6j | \rightarrow \boxed{z_L = 1.0+0.6j}$$

$$y_{in} = \frac{1}{1+0.6j} \Rightarrow \boxed{y_{in} = 0.7353 - j0.4411} \rightarrow \underline{0.74-0.44j}$$

$$\frac{d}{\lambda} = \frac{3.1m}{2m} = \boxed{1.55\lambda}$$

$$\Gamma = \frac{Z_L - Z_o}{Z_L + Z_o} = \frac{(50+j30)-(50)}{(50+j30)+(50)} = \frac{j30}{100+j30} \Rightarrow \boxed{\Gamma = j0.3}$$

$$\boxed{\Gamma = 0.287 e^{1.279j}}$$

$$VSWR = \frac{1+|\Gamma|}{1-|\Gamma|} = \frac{1+|0.287e^{1.279j}|}{1-|0.287e^{1.279j}|} \Rightarrow \boxed{VSWR = 1.8064}$$

A) $\Gamma = 0.287 e^{1.279j}$
VSWR = 1.8064
$Z_{in} = 1+0.6j$

$\boxed{Z_{in} = 1.5 + j0.6}$

$\frac{2.8\lambda - 0.185\lambda}{2}$ wtg

B) Z_w @ $\ell = 0.25m$

b) $\frac{0.25}{2} = \boxed{0.125\lambda}$ wtg

$$\boxed{Z_w(025) = 1.9 + 0.3j}$$

c) stub match (single stub)

$d_s = 0.40 + 0.161 = 0.561\lambda$
$\wedge = 0.34 + 0.161 = 0.461\lambda \leftarrow$ shorter
$y_{stub} = 1 + j0.95$ @ 0.161 and 0.346

$$\boxed{d_s = 0.68m} \quad \boxed{Z_{stub} = 0.5256 + j0.4993}$$
$y_{stub} = 1 - j0.95$

c) Stub matching

$$y_{stub} = \underline{1 \pm 0.95j}, \quad d_s = 0.4 + 0.161 = \underline{0.561\lambda}$$

$$d_s = 0.34 + 0.161 = \cancel{0.461\lambda} \; \underline{0.501\lambda}$$

$y_{stub} = 1 + 0.95j$	$y_{stub} = 1 - 0.95j$
add : $0 - j0.95$	$0 + 0.95j$
length : 0.371λ	0.129λ
meters : 0.742	$\underline{0.258\,m}$

$$\cancel{stub} \boxed{y_{stub} = 1 - 0.95j} \;, \; \boxed{d_s = 0.258\,m}$$

The Complete Smith Chart
Black Magic Design

Given:
$f = 112.5 \, MHz$
$\lambda = 2 \, m$
$Z_0 = 50 \, \Omega$
$Z_L = 50 + j30 \, \Omega$
$V_p = 2.25 \times 10^8 \, m/s$

$\ell = 3.1 \, m$

Find:
$\Gamma, VSWR$
Z_{in}

Keeyan Smith
Emag group work 2
5/26/22

0.125
0.85 → 0.05
0.148
0.161
0.121
0.198

$Z_w (0.25$

0.40
← 5 wtl
0.379