King Fahd University of Petroleum & Minerals
Electrical Engineering Department
EE-407; Exam-1(062); 31st of March, 2007

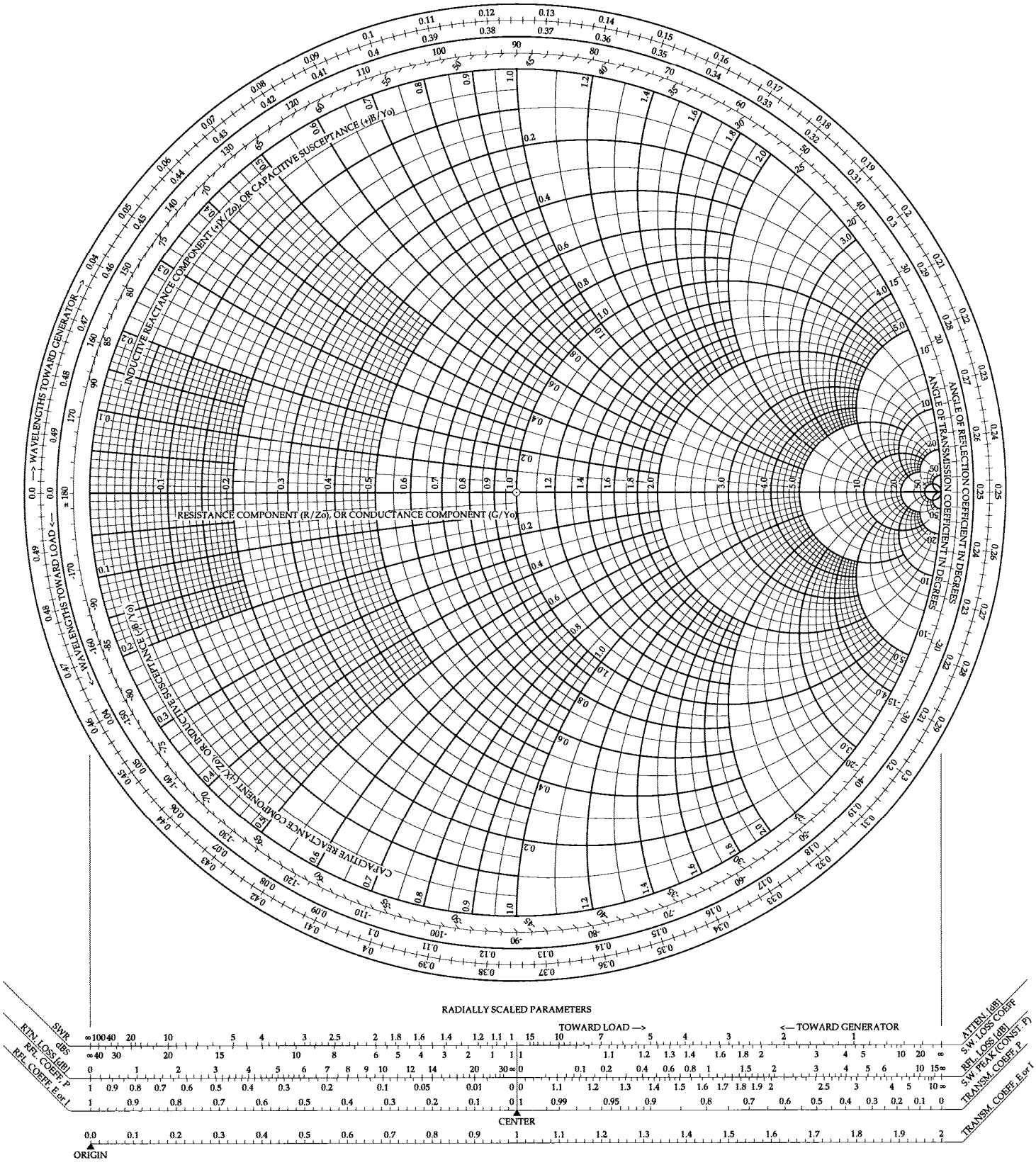
Prob.1	Prob.2	Prob.3	**Total**

Answer **ALL THE** questions. All questions carry **equal** marks.

Name: ***I.D.***

Q.1(a) Calculate the phase constant of a lossless line with a high dielectric constant, capacitance per unit length of 45 pF/m and a characteristic impedance of 50Ω. Assume the line is operating at 1 GHz.

Q.1(b) A load impedance of Z_L=80+j20 Ω is to be matched to a Z_0=100Ω transmission line using a matching section. **Find the required values** (‘*l*’ and ‘$\pm jX$’) of the matching section. Finally **draw the circuit** to show the line, load and the matching section (**use the given Smith Chart of next page**)


RESISTANCE COMPONENT (R/Zo), OR CONDUCTANCE COMPONENT (G/Yo)
INDUCTIVE REACTANCE COMPONENT (+jX/Zo), OR CAPACITIVE SUSCEPTANCE (+jB/Yo)
CAPACITIVE REACTANCE COMPONENT (-jX/Zo), OR INDUCTIVE SUSCEPTANCE (-jB/Yo)
ANGLE OF REFLECTION COEFFICIENT IN DEGREES
ANGLE OF TRANSMISSION COEFFICIENT IN DEGREES
0.0 —> WAVELENGTHS TOWARD GENERATOR —>
<— WAVELENGTHS TOWARD LOAD <— 0.0
RADIALLY SCALED PARAMETERS
TOWARD LOAD —>
<— TOWARD GENERATOR
SWR
RTN. LOSS (dB)
REFL. COEFF., P
REFL. COEFF., E or I
ATTEN. (dB)
S.W. LOSS (dB)
REFL. LOSS (dB)
S.W. PEAK (CONST. P)
TRANSM. COEFF., P
TRANSM. COEFF., E or I
CENTER
ORIGIN

Q.2 A loss-less transmission line is 0.4λ long, has a characteristic impendence of 50Ω and is terminated in a load of 60+j35Ω. The transmission line is supplied by a matched source of $V_S=100\angle 0°$. Without using the smith-chart,

(i) Find the load reflection coefficient.

(ii) Find the input reflection coefficient.

(iii) Find the VSWR on the line.

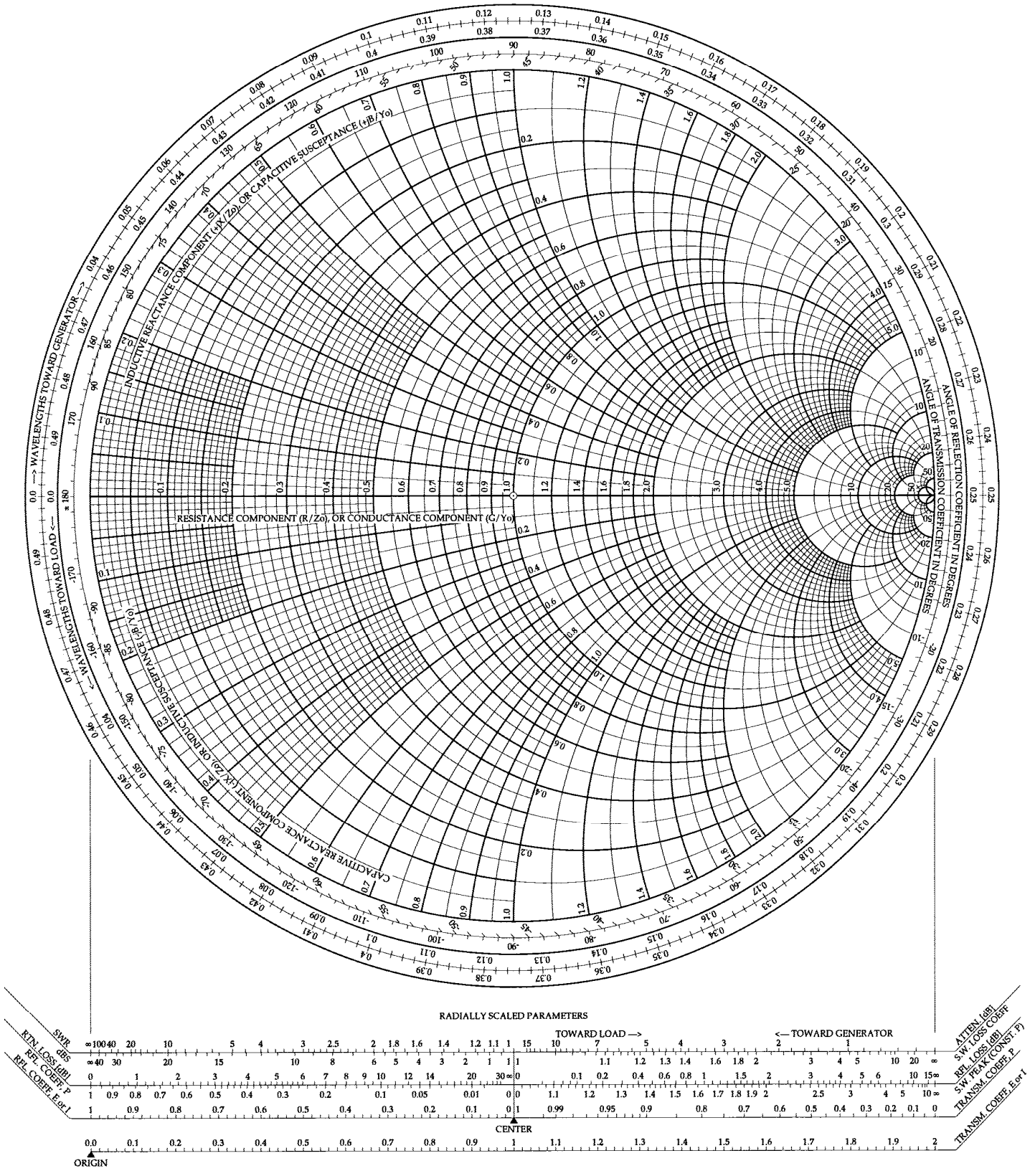
(iv) If the line becomes lossy, what equation will be used to fine Input impedance?

Q.3 A loss-less transmission line of length '52 mm' and characteristic impedance of $Z_0=100\Omega$ is terminated in a load impedance of $Z_L=30+j50\Omega$. If $\lambda=\lambda_0$ and the propagating signal frequency, f=0.75 GHz, then use **smith-chart** to calculate;

(i) the **load reflection coefficient** of the transmission line.

(ii) the **VSWR** along the transmission line.

(iii) the '$\mathbf{Y_{in}}$' at '52 mm' away from the load.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