Examination question paper for:

Elen3000– Electromagnetics

Printed on: September 8, 2008.

This covering page *must not* be sent for printing as part of the question paper.

Note: Show ALL workings, complete with the necessary comments!!—regardless of how fast your calculator can print the results in one step. I am not interested in how well you can read your formulae from your formula sheet. I am marking your reasoning, not only the answer!! Marks are awarded for the reasoning as well as the "answer". A correct numerical answer will not necessarily attract any marks!

Question 1

Telkom is using DECT as a Wireless Local Loop (WLL) for rural digital telecommunication systems. DECT runs at 1 800MHz and eliminates the very expensive copper usually used in the local loop. The DECT transmitter is situated at the base of a 30m mast and it feeds an antenna at the top of the mast which can be modelled as a 73Ω load in series with an inductor of 3.8nH.

The antenna is connected to the transmitter with RG58 cable, which has a 50Ω characteristic impedance and a velocity factor of 0.66.

(a) Determine the VSWR on the transmission line. (5 marks)

(b) For a 10W transmitter, determine the maximum voltage on the line. (5 marks)

(c) Design a double stub tuner to match the antenna to the transmission line. Give all dimensions of your design as physical lengths. (15 marks)

(d) Design a non-stub based matching network. (10 marks)

(Total 35 marks)

Question 2

Answer in 2–3 lines each:

(a) Why match?

(b) What exactly is characteristic impedance?

(c) What is WiMax?

(d) What is the *MECHANISM* by which a quarter-wave transformer operates?

(8 marks)

(Total 40, 3 bonus marks)

The Smith Chart Calculator

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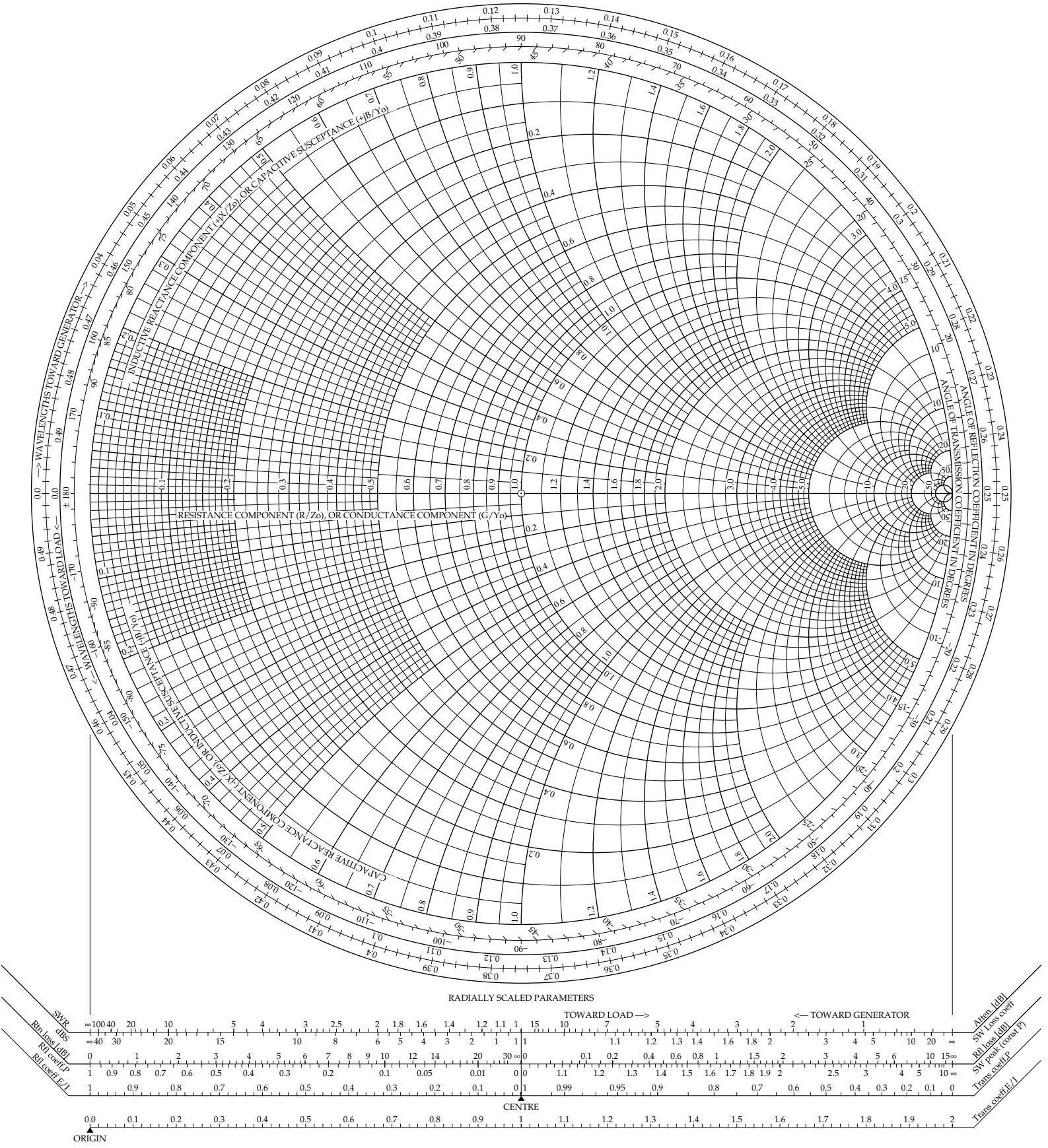

The Smith Chart Calculator

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