

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

Prob.1	Prob.2	Prob.3	Total

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

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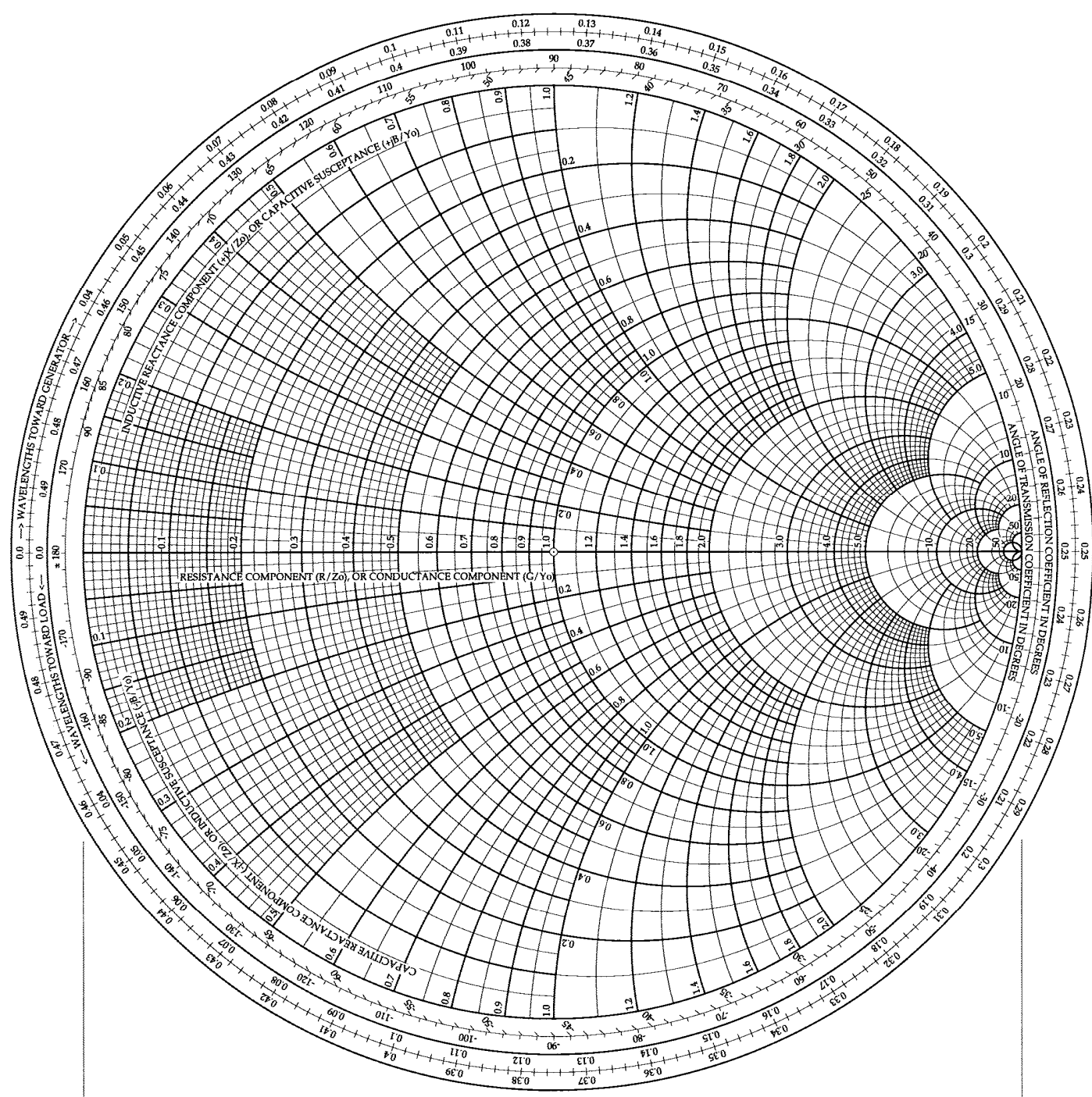
**Name:**

***I.D.***

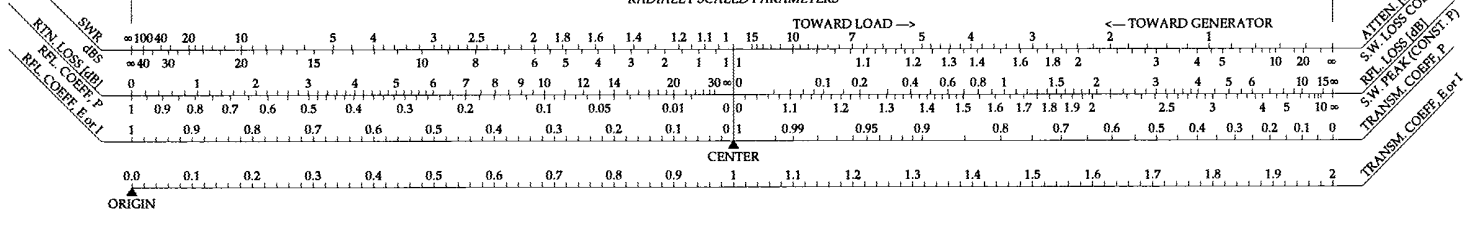
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**Q.1(a)** Calculate the phase constant of a lossless line with a high dielectric constant, capacitance per unit length of 45 pF/m and a characteristic impedance of 50Ω. Assume the line is operating at 1 GHz.

**Q.1(b)** A load impedance of  $Z_L=80+j20 \Omega$  is to be matched to a  $Z_0=100\Omega$  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**)



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**Q.2**

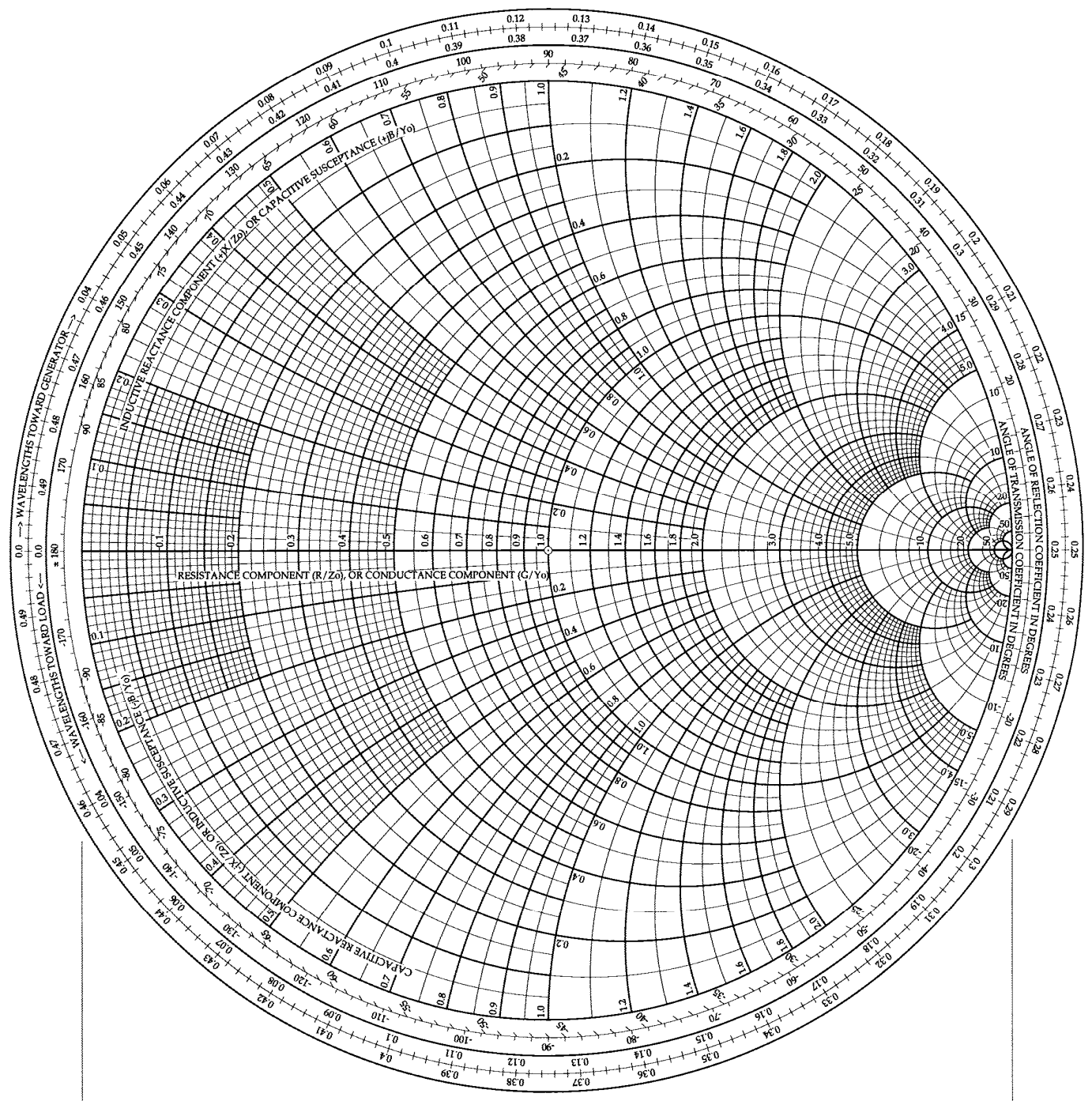
A loss-less transmission line is  $0.4\lambda$  long, has a characteristic impedance of  $50\Omega$  and is terminated in a load of  $60+j35\Omega$ . The transmission line is supplied by a matched source of  $V_s=100\angle 0^\circ$ . Without using the smith-chart,

- (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 find Input impedance?

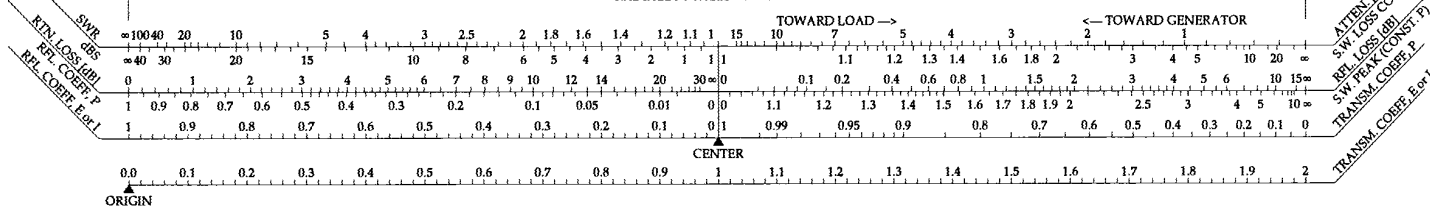
**Q.3**

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 ' **$Y_{in}$** ' at '52 mm' away from the load.



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