3.4 SMITH CHART:

- Developed in 1939 by P. W. Smith as a graphical tool to analyze and design transmission-line circuits
- Today, it is used to characterize the performance of microwave circuits
- Impedances, voltages, currents, etc. all repeat every half wavelength
- The magnitude of the reflection coefficient, the standing wave ratio (SWR) do not change, so they characterize the voltage & current patterns on the line
- If the load impedance is normalized by the characteristic impedance of the line, the voltages, currents, impedances, etc. all still have the same properties, but the results can be generalized to any line with the same normalized impedances
- The Smith Chart is a clever tool for analyzing transmission lines
- The outside of the chart shows location on the line in wavelengths
- The combination of intersecting circles inside the chart allow us to locate the normalized impedance and then to find the impedance anywhere on the line

STEP 1:

Fig 3.4.1, draw the positive XL circles

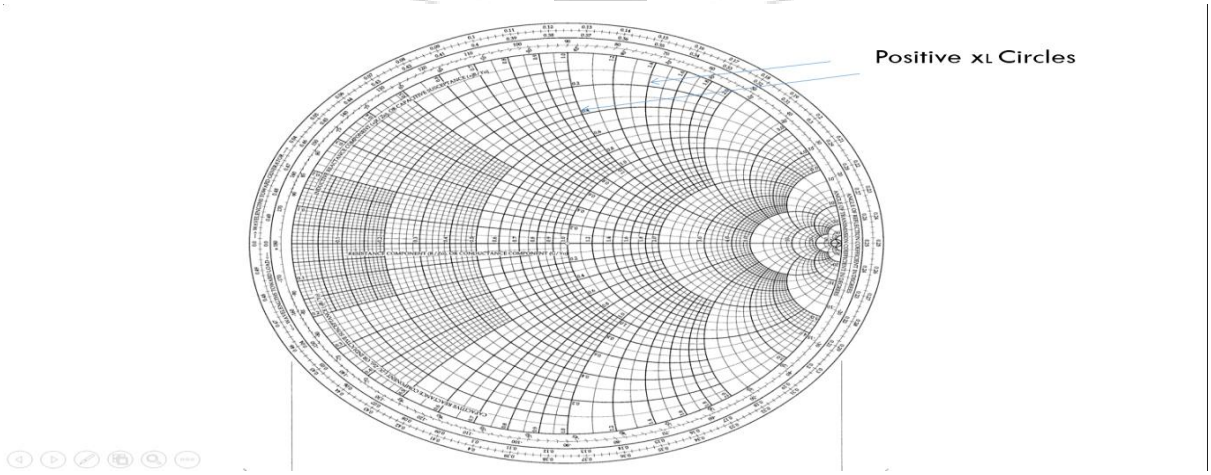

Fig: 3.4.1 Positive xL circles

STEP 2:

Fig 3.4.2, draw the rL circles

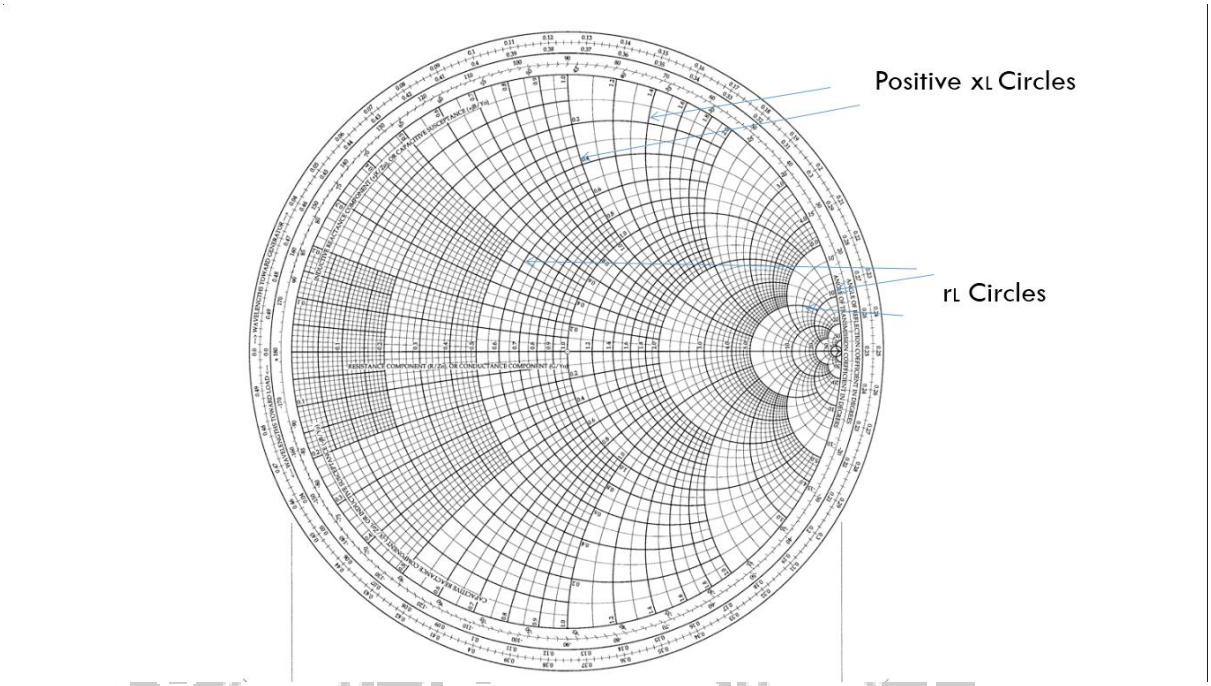

Fig: 3.4.2 Positive rL circles

STEP 3:

Fig 3.4.3, draw the negative XL circles

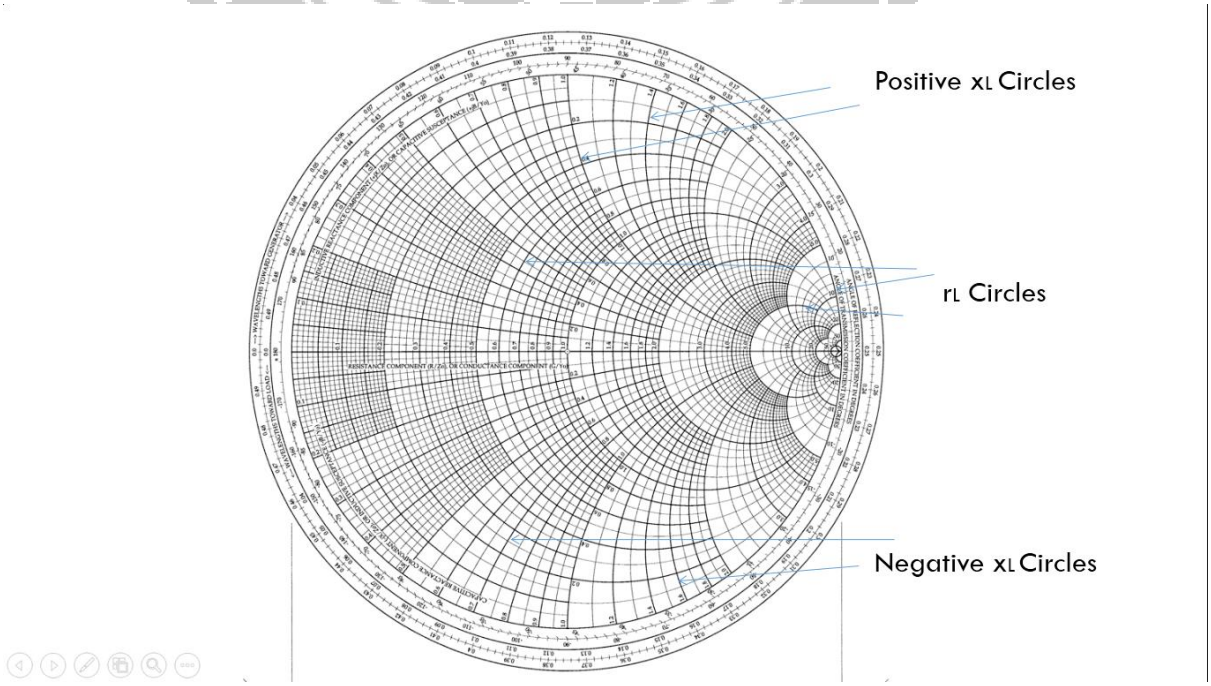

Fig: 3.4.3 Negative xL circles

STEP 4:

Fig 3.4.4, mark the impedance (3 + j3) in the smith chart

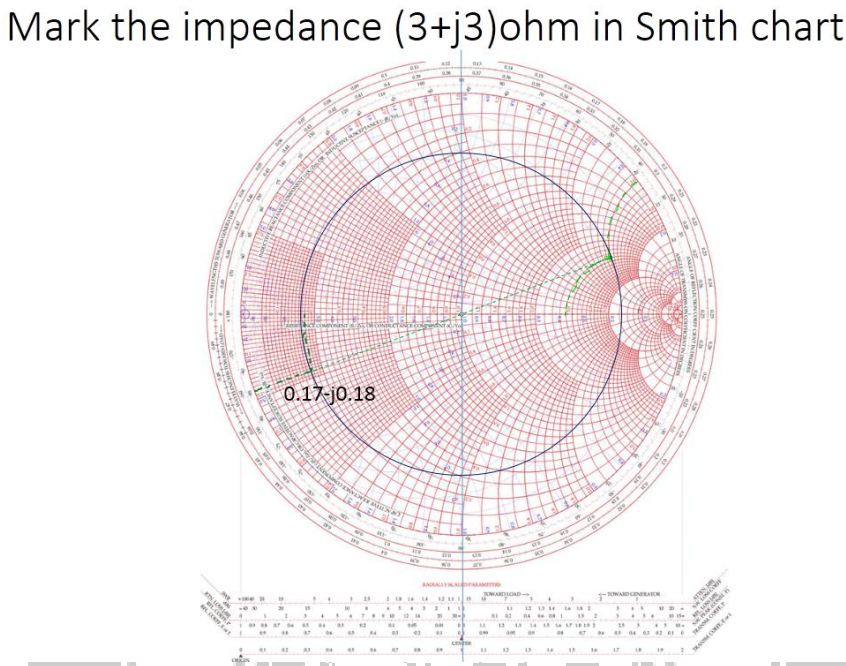

Fig: 3.4.4 Mark the impedance (3 + j3) in the smith chart

[Source: John D Ryder, —Networks, lines and fields‖, 2nd Edition, Prentice Hall India, 2015]