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

**Name: **

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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 $Z_L=80+j20$ Ω is to be matched to a $Z_0=100$Ω 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)
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 $V_s=100\angle0^\circ$. 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 ‘$Y_{\text{in}}$’ at ‘52 mm’ away from the load.