

Time: 3 Hours

Subject: Network Theory

Max. Marks: 70

Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each question carries 14 Marks.
(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.
(iii) Missing data, if any, may be suitably assumed.

1. (a) Define Symmetry and Reciprocity.
(b) Define Characteristic Impedance and Propagation Constant.
(c) Write advantages of m-derived filter.
(d) Define Inverse impedance and give example.
(e) Explain Properties of Hurwitz Polynomial.
(f) Determine the image impedance parameters? if series arm impedances $Z_A=200\ \Omega$ $Z_B=150\ \Omega$ and shunt arm impedance $Z_C=180\ \Omega$.
(g) Draw the Circuit diagram of Foster form - I.
2. (a) Derive the expression for image impedances in terms of ABCD parameters.
(b) The y-parameters of a two port network are $Y_{11}=0.8\ \text{mho}$, $Y_{22}=1.8\ \text{mho}$ and $Y_{12}=Y_{21}=-0.5\ \text{mho}$. (i) Determine the ABCD parameters and (ii) The equivalent π network.
3. (a) Show that $(Z_{OT})^2 = Z_{oc} \cdot Z_{sc}$
(b) Calculate the iterative impedance of an asymmetrical T - network having two series arm impedances $150\ \Omega$ and $250\ \Omega$ and shunt arm impedance $300\ \Omega$.
4. (a) A Prototype high pass filter has a cut-off frequency of $15\ \text{kHz}$ and nominal impedance is $400\ \Omega$. Calculate the element values of L and C.
(b) If an m-derived high pass filter has design impedance of $350\ \Omega$ and cut-off frequency of $2.7\ \text{kHz}$ and infinite attenuation at $1.8\ \text{kHz}$, design the filter.
5. (a) Design a Symmetrical T- attenuator that offers $60\ \text{dB}$ attenuation when the load is $420\ \Omega$.
(b) Design a full series Equalizer shown in figure (a), such that it gives $20\ \text{dB}$ at attenuation at $800\ \text{Hz}$ and whose design resistance R_0 is $750\ \Omega$ -determine the values of L_1 and C_2 .

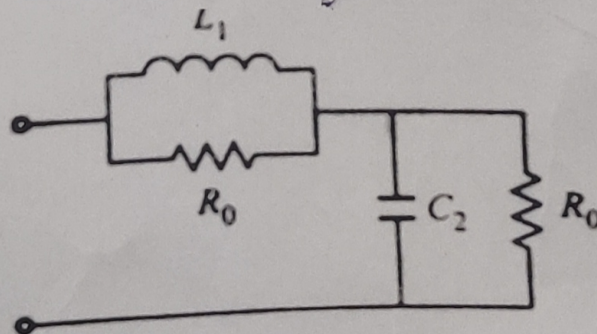


figure (a)