

### Additional Question (will not be marked)

Please derive the real power, reactive power, and complex power delivered to the load for four kinds of a-b-c sequence, balanced source and balanced load three-phase circuits (Y-Y, Y- $\Delta$ ,  $\Delta$ -Y,  $\Delta$ - $\Delta$ ). The RMS phase voltages for all four circuits are equal to  $\mathbf{V}_s \angle \boldsymbol{\theta}$  (for source-a,  $\boldsymbol{\theta} = 0^\circ$ ) and the impedances connected in each phase for all four circuits are  $\mathbf{Z} = \mathbf{R} + \mathbf{jX}$ . All sources are ideal ones and all line voltage drops are equal to zero.