EE6322D - STATIC VAR CONTROLLERS AND HARMONIC FILTERING – WINTER 2023-24

Assignmet – 1(a)

1. A three-phase three-wire unbalanced load draws 10+j0 A current from R-line and 5.774∠-150^0 A current from B-line. (i) Find the third line current. (ii) If a passive compensator is connected such that the effective load becomes balanced and at upf, then, find the source line currents in phasor form. (iii) Find the delta-connected compensator impedances in Ohms required to achieve this.

2. A three-phase four-wire unbalanced load draws 10+j0 A current from R-line and 5.774∠-150^0 A current from B-line and delivers 3.5∠-30^0 A current to supply neutral. (i) Find the third line current. (ii) If a passive compensator is connected such that the effective load becomes balanced and at upf, then, find the source line currents in phasor form. (iii) Find and draw the circuits of various options for the passive compensator required to achieve this and mark the impedances in Ohms.

3. A single-phase load connected between two lines of a 1.1kV, 50Hz, 3-Phase, 3-Wire system is seen to take a variable power of 100kVA at 0.7 lag to 50kVA at 0.9 Lag depending on the various stages of process that this load is catering to. Design a Steinmetz compensator network that can convert this load into a balanced three-phase load at upf under all conditions and specify the range of variation needed in all the components of this compensator.