PROBLEM SHEET 4

Elementary a.c. circuits

1. Determine capacitive reactance X_C for a capacitor $C = 10$ nF at frequencies:

   a) $f = 50$ Hz; b) $f = 1000$ Hz; c) $f = 20$ kHz; d) $f = 1$ MHz.

2. Determine capacitive reactance X_C at frequency $f = 4$ kHz for a capacitor:

   a) $C = 1000$ pF; b) $C = 20$ nF; c) $C = 0.8$ μF; d) $C = 50$ μF.

3. Determine inductive reactance X_L for a coil $L = 0.2$ H at frequencies:

   a) $f = 50$ Hz; b) $f = 1000$ Hz; c) $f = 20$ kHz; d) $f = 1$ MHz.

4. Determine inductive reactance X_L at frequency $f = 4$ kHz for a coil:

   a) $L = 10$ mH; b) $L = 300$ mH; c) $L = 2.5$ H.

5. A circuit consists of a resistor R, a capacitor C and a coil L connected in series. Determine capacitive reactance X_C, inductive reactance X_L, total reactance X, impedance Z of the circuit and phase difference φ between voltage and current if:

   a) $R = 800\ \Omega$, $C = 2$ μF, $L = 0.8$ H and angular frequency $\omega = 1260$ rad/sec;

   b) $R = 300\ \Omega$, $C = 1.5$ μF, $L = 0.3$ H and frequency $f = 120$ Hz.