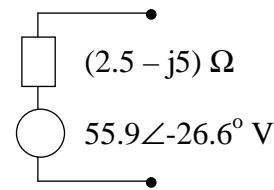


**UEE 201 - THEORY OF ELECTRICITY - Answers****Final Part I Examination 1997/98 - June 1999** (held in November 1999)

- A1** (a)  $Z_{AC} = 4.8 + j6.4 \Omega$  or  $8 \angle 53.1^\circ \Omega$   
 (b)  $A = 1.6 + j0.8$  or  $1.789 \angle 26.57^\circ$ ,  $C = 0.2 \text{ S}$   
 (c)  
 (d)  $240 \angle 30^\circ = (6 + j19) i_1 - (6 + j11) i_2$   
 (e)  $R = 1.789 \Omega$ ,  $X = 1.342 \Omega$   
 (f) 0.25, 1.75, 1.78, 1.017  
 (g)  $11.27 \times 10^6 \text{ H}^{-1} \text{ m}^{-1}$ , 22.18 mH



**A2**  $5.30 \angle -24.4^\circ$ ,  $4.73 \angle -13.4^\circ$ ,  $1.12 \angle -78.7^\circ$

**A3**  $Z_1 = 78.92 - j103.3 \Omega$ ,  $Z_2 = 50 + j120 \Omega$

**A4** (a) 45.4 A, (b) 24.74 kW, (c)  $540.3 \angle 5.16^\circ \text{ V}$ , (d) 0.728 lag, (e) 3 of 74.93  $\mu\text{F}$

**A5**  $17.7 \angle -4.2^\circ \text{ A}$ ,  $9.46 \angle -111.2^\circ \text{ A}$ ,  $17.4 \angle 144.6^\circ \text{ A}$

$$\begin{bmatrix} 0.00 \\ 14.47 \angle 9.8^\circ \\ 5.02 \angle -48.3^\circ \end{bmatrix} \text{ A}, \begin{bmatrix} 0.0 \\ 110.3 \angle 33.0^\circ \\ 38.3 \angle -25.1^\circ \end{bmatrix} \text{ V}, \quad 4.94 \text{ kW}$$

**A6** (a)  $\begin{bmatrix} 1 - j1 & 20 - j10 \\ -j0.1 & 1 - j1 \end{bmatrix}$ , (b) Node-Branch incidence matrix =  $\begin{bmatrix} -1 & 1 & -1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 1 & 1 & 0 \\ 1 & 0 & 0 & 0 & -1 & -1 \end{bmatrix}$ ,

$$\text{Nodal admittance matrix} = \begin{bmatrix} 1.12 - j0.66 & -1 & -0.12 + j0.16 \\ -1 & 2 - j0.25 & j0.25 \\ -0.12 + j0.16 & j0.25 & 0.37 - j0.41 \end{bmatrix}$$

V, V, V

**A7**  $38.7 \cos(314.16t + 36^\circ) + 29.47 \cos(3 \times 314.16t + 108^\circ) + 16.21 \cos(5 \times 314.16t + 180^\circ) + \dots \text{ A}$   
 $4056 \cos(314.16t + 53.4^\circ) \text{ V}$

**A8**  $I(s) = \frac{5000}{s^2} (1 - 2e^{-2000s} + e^{-4000s})$ ,  $V(s) = (0.002s + 1) \frac{5000}{s^2} (1 - 2e^{-2000s} + e^{-4000s})$

