EE 451 – HW7

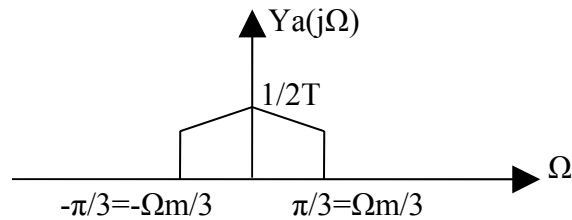**4.11**

4.14

$$|Ga(j\Omega)| = \frac{\Omega}{\sqrt{\Omega^2 + a^2}}$$

As $\Omega = 0$ then $|Ga(j0)| = 0$
  $\Omega = \infty$ then $|Ga(j\infty)| = 1$

At 3-db $|Ga(j0)|^2 = 1/2$, therefore $\Omega_c = a$

4.25 The order of a Type 1 Chebyshev filter can be found from the equation:

$$N = \frac{\cosh^{-1}(1/k1)}{\cosh^{-1}(1/k)} = 2.415 \rightarrow N = 3$$

```
[N,wn]=cheb1ord(2*pi*1500,2*pi*6000,0.25,25,'s')

N=3
```

4.32 The order for an elliptic analog filter can be found from the equation:

Using a lowpass to bandpass spectral transformation we find
that $\Omega p = 1$ rad/sec (we pick this value) and $\Omega s = 1.28$ rad/sec

$$N = \frac{2 * \log 10(4/k1)}{\log 10(1/\rho)} = 6.031 \rightarrow N = 7$$

```
[N,wn]=ellipord(1,1.28,.25,50,'s')

N=7 (Lowpass)

[N,wn]=ellipord([2*pi*20 2*pi*45],[2*pi*15 2*pi*50],0.25,50,'s')

N=7  (Bandpass)
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M4.6

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[N,wn]=ellipord(1,1.28,0.25,50,'s');
[NLp,DLp]=ellip(N,0.25,50,wn,'s')
[NBp,DBp]=lp2bp(NLp,DLp,2*pi*30e3,2*pi*25e3)
```