



Princess Sumaya  
University  
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EE27355  
Communication Principles

Quiz #4  
Sunday 29/3/2026

Name:.....



Section 1

Q.1) Figure Q.1 uses two identical nonlinear elements shown by boxes marked NL. Let the input-output characteristics of either of the nonlinear elements be approximated by a power series:  $y(t)=x(t)+x^2(t)$ . If the bandwidth of  $m(t)$  is 10,000 Hz and carrier frequency  $\omega_c=100,000\pi$  K rad/sec.

Analyze the system that is shown in Figure Q.1 and find the output after the Output Filter for the following types of filters:

1. Output after LPF (from  $-20,000\pi$  to  $20,000\pi$  rad/sec).
2. Output after BPF (from  $80,000\pi$  to  $120,000\pi$  rad/sec).
3. Output after BPF (from  $180,000\pi$  to  $220,000\pi$  rad/sec).
4. Output after BPF (from  $280,000\pi$  to  $320,000\pi$  rad/sec).

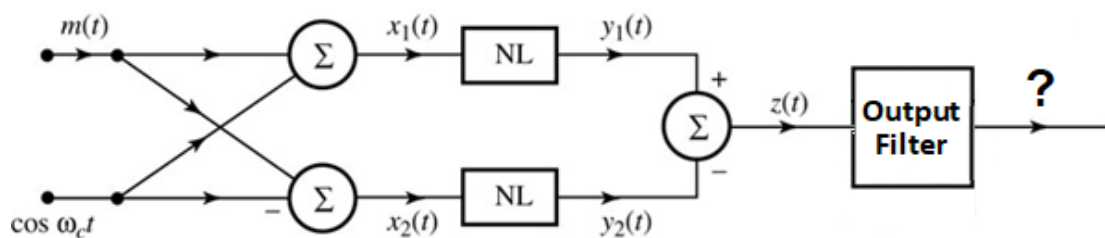
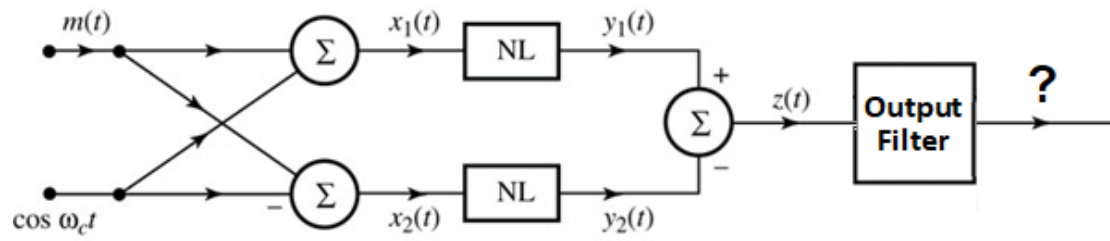


Figure Q.1

Solution: [10-Points]



$$y(t) = x(t) + x^2(t)$$

Bandwidth of  $m(t)$  is 10,000 Hz and carrier frequency  $\omega_c = 100,000\pi$  K rad/sec.