

Indian Institute of Space Science and Technology  
AV312 - Digital Communication  
Department of Avionics

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**Assignment 2**

**Question 1:** Suppose  $m(t)$  is a real valued baseband modulating signal. Let  $M(f)$  be the FT of  $m(t)$ . Assume that  $M(f) = 0$  for  $f \notin [-B_m, B_m]$ .

Let  $x(t)$  be the upper side band obtained from  $m(t)$  using single side band modulation. The carrier used for modulation is  $\cos(2\pi f_c t)$  with carrier frequency  $f_c$ , where  $f_c \gg B_m$ . The signal  $x(t)$  is transmitted over an ideal channel such that the received signal  $y(t)$  is  $x(t)$  itself. The signal  $y(t)$  is applied to a system consisting of an ideal differentiator followed by an ideal envelope detector to obtain a signal  $z(t)$ . Assume that the ideal envelope detector extracts  $a(t)$  from  $a(t)\cos(\theta(t))$ . Write down an expression for  $f(t)$  in terms of  $m(t)$ .

**Question 2:** Do questions 2.28, 2.33, 2.36, 2.40 from the textbook ("Communication Systems" - Haykin) Please try to do these questions on your own without referring to any solution manual.