NAVAL POSTGRADUATE SCHOOL
Monterey, California

EC 3550 Po 22 October 1987

Midterm Exam I

- This exam is *open book and notes.*
- There are four questions; each is equally weighted.
- Partial credit will be given so be sure to do some work on each part of each problem.
- Do **NOT** do *any* work on the exam sheets.
- Clearly show *all* work.

1	
2	
3	
4	
TOTAL	

NAME: _____

1. An optical fiber has a measured output power of -40 dBμ with an input power of 22 μW. Calculate the fiber loss in dB/km if the fiber under test is 10,320 m long.

2. The absolute value of (normalized) waveguide dispersion of a 6 km long fiber is measured as 5.5 ns–km^{-1}. If the V-parameter of the single mode fiber is known to be 2.1 with the core index equal to 1.48 and $\Delta = 0.2\%$, calculate the fractional linewidth (in *percent*) of the source used in the measurement.

3. A digital signal has a bit length of 90 ns. The input signal is analog and has been sampled at 10 times the Nyquist rate and digitized at 12 bits per sample. Calculate the analog signal bandwidth.

4. Consider a 100/140 graded index fiber with $g = 2$. The numerical aperture at the center is NA(0) = 0.22, and $\Delta = 1.2\%$. Calculate the number of modes in the fiber at an operating wavelength of 850 nm.