

NAVAL POSTGRADUATE SCHOOL  
Monterey, California

EC 3210

MIDTERM EXAM I

11/89Po

- This exam is open book and notes.
- There are three problems; each is equally weighted.
- Partial credit will be given; be sure to do some work on each problem.
- Be sure to include units in your answers.
- Please circle or underline your answers.
- Do *NOT* do any work on this sheet.
- Show *ALL* work.

1	
2	
3	
Total	

Name: \_\_\_\_\_

1. A laser has a longitudinal coherence length of 1 mm. If the spectral linewidth is 1 nm, find the frequency of the laser.



2. Show that the sum of a left circularly polarized wave and a right circularly polarized wave of the same amplitude is a linear polarized wave.



3. A gas discharge emits light with a center frequency of  $1 \times 10^{14}$  Hz and a linewidth  $\Delta\nu$  of 1 GHz. We want to design a scanning Fabry–Perot (FP) interferometer so that we are sure of measuring the frequency spectrum of this light with 100 equally–spaced data points in the frequency range extending from  $\nu_0 - \frac{\Delta\nu}{2}$  to  $\nu_0 + \frac{\Delta\nu}{2}$ .
  - (a) Calculate the maximum value of the mirror spacing  $d$  for this scanning FP interferometer.
  - (b) Using the value calculated in Part a, calculate the required translation value  $\Delta d$  of the interferometer.