Assignment 2

The due date for submitting this assignment has passed. As per our normal procedure for assignments that pass the due date, you will receive a grade of 0.

1. A special width of 3.0 cm around a center wavelength of 1050 nm corresponds to ___ of spectral width on frequency.  
   No. of attempts is 1.  
   Correct Answer: 0.015  
   1.0 point

2. Anti-reflection (AR) coatings are used to reduce reflection of light at an interface due to internal to internal reflectance. Let us assume you would like to maximize the amount of light passing through a glass optic element whose transmission is 60%. What should be the reflective index of the AR coating material?  
   No. of attempts is 1.  
   Correct Answer: 1.5  
   1.0 point

3. In the above question on AR coatings, the minimum thickness of the AR coating used should be ___ nm  
   No. of attempts is 1.  
   Correct Answer: 100  
   1.0 point

4. Consider a Fabry-Perot interferometer whose center wavelength is 1050 nm and the desired fringing range is 100 cm around that wavelength with the condition that only one transmission peak is allowed within this fringing range. Assuming an air medium in the cavity, determine the minimum thickness of air (V) that should be less than the fringing range.  
   No. of attempts is 1.  
   Correct Answer: 100 nm  
   1.0 point

5. If we need to resolve two wavelengths within the FWHM which are 0.3 nm apart, the minimum finesse required for the above Fabry-Perot cavity is ___  
   No. of attempts is 1.  
   Correct Answer: 100  
   1.0 point

6. Calculate the minimum reflectivity of the mirrors (assuming equal reflectivity, not trying) required for releasing the above finesse (please hence the wavelength).  
   No. of attempts is 1.  
   Correct Answer: 0.67  
   1.0 point

7. Assume we have a source of a diode laser interferometer through a distance of 0.223 m and we observe 800 alternating bright and dark fringes.  
   No. of attempts is 1.  
   Correct Answer: 0.223 m  
   1.0 point

8. A light emitting diode (LED) light with a wavelength of 650 nm is centered about a frequency corresponding to a wavelength of 400 ± 10 pm. The coherence length L corresponds to the above case ___ pm.  
   No. of attempts is 1.  
   Correct Answer: 600 nm  
   1.0 point

9. We have to design a diodes mirror with high reflectivity using multiple reflectors. Find the minimum thickness of high and low index layers which work.  
   No. of attempts is 1.  
   Correct Answer: 0.67  
   1.0 point

10. We have a source having a spectral width of 10.0 nm and the mean wavelength of the source is 1000 nm. Determine the maximum resolution (in nm) of an interference spectrometer which can resolve these two sources.  
    No. of attempts is 1.  
    Correct Answer: 0.1  
    1.0 point

Note: You may receive a bonus of 50% for the above question.