

PHYS 2135

Total

End Material Test
December 10, 2019

Name: _____ **Key** _____

Recitation: _____

Do not open the test until instructed to do so by the test proctors. When instructed to open the test, remove only the cover sheet and starting equations from the test.

Write clearly on this page the answer you believe is the best or most nearly correct answer. You may also record the answers on your starting equation sheet for later comparison with the answer key, which will be posted after all students have taken the test. When you finish both the End Material Test and the Final Exam, turn both in to the test proctor with all pages, including this page, stapled together. You may keep the starting equation sheets or leave them with the test proctor to be recycled.

Calculators are NOT allowed!

Each question is worth 6 points, except question 8, which is worth 8 points.

Your Answers:

1. D

2. C

3. C

4. C

5. C

6. A

7. A

8. _____

End Material Test

- The image made by a thin lens is smaller than the object and oriented the same as the object. Select the correct statement.

 - [A] The lens is converging and the object is closer to the lens than the focal point.
 - [B] The lens is converging and the object is at the focal point.
 - [C] The lens is converging and the object is farther from the lens than the focal point.
 - [D] The lens is diverging.
- Select the statement that means a pair of electromagnetic waves at a given location are in phase.

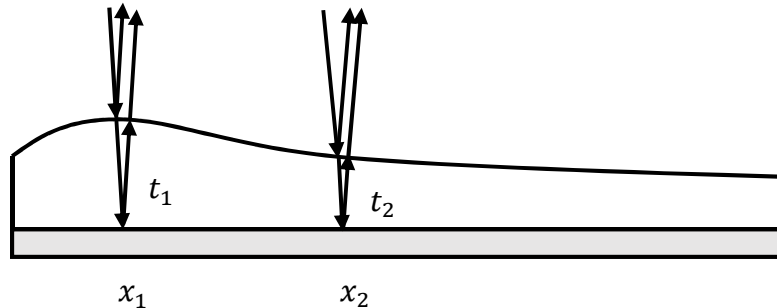
 - [A] The two waves have the same electric field amplitude.
 - [B] The two waves have the same magnetic field amplitude.
 - [C] The arguments of the two sine functions differ by $2m\pi$ where m is an integer.
 - [D] The two waves are traveling at the same speed.
- Two light sources $\lambda_1 < \lambda_2$ illuminate identical double-slit apparatuses. Δy is the bright fringe separation on the screen. Select the correct statement.

 - [A] $\Delta y_2 < \Delta y_1$
 - [B] $\Delta y_2 = \Delta y_1$
 - [C] $\Delta y_2 > \Delta y_1$
 - [D] The relative fringe separations cannot be determined from the given information.
- Light of wavelength λ illuminates a single slit and produces a diffraction pattern on a screen beyond the slit. The screen is slowly moved away from the slit. As the screen is moved the distance between dark fringes on the screen ...

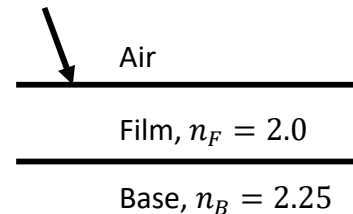
 - [A] decreases.
 - [B] remains constant.
 - [C] increases.
 - [D] may or may not change. The relative change cannot be determined from the given information.
- A laser illuminates a diffraction grating producing a separation Δy_0 between bright fringes on a screen. The grating is replaced by a grating with more lines per centimeter producing a new separation Δy_f between bright fringes on the screen. Select the correct statement.

 - [A] $\Delta y_f < \Delta y_0$
 - [B] $\Delta y_f = \Delta y_0$
 - [C] $\Delta y_f > \Delta y_0$
 - [D] The relative separations cannot be determined from the given information.

6. Light reflects off the top and bottom surfaces of a thin film of varying thickness as illustrated. λ_1 is the largest wavelength maximally reflected at x_1 where the film thickness is t_1 . λ_2 is the largest wavelength maximally reflected at x_2 where the film thickness is $t_2 < t_1$. Select the correct statement.



- [A] $\lambda_2 < \lambda_1$
 [B] $\lambda_2 = \lambda_1$
 [C] $\lambda_2 > \lambda_1$
 [D] The relative size of the wavelengths cannot be determined from the given information.
7. Light of wavelength λ shines on a thin film as illustrated. Determine the minimum thickness of film resulting in minimal reflection.



- [A] $t = \frac{1}{8}\lambda$
 [B] $t = \frac{1}{4}\lambda$
 [C] $t = \frac{1}{2}\lambda$
 [D] $t = 2\lambda$
8. **[8 Free points.]** Select the correct statement.
- [A] The break between semesters destructively interferes with learning.
 [B] The break between semesters has a higher index of retention than Spring Break.
 [C] The final exam is the focus where understanding and grades converge.
 [D] The free questions are grating.