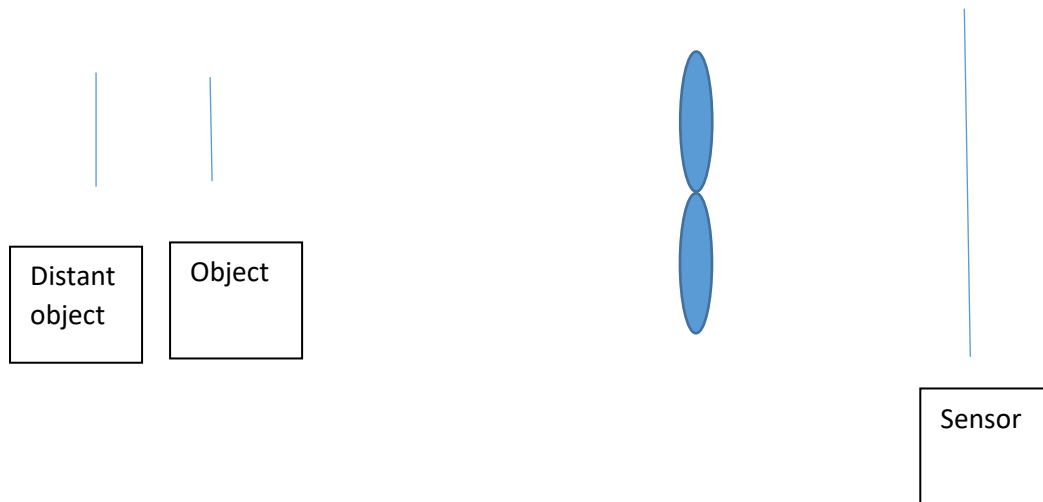


The Questions

1. Why is Optical Engineering important? The general answer about its importance to manufacture optical system for the people.
2. Which Optical System do you want to talk about? I chose eye.
3. Draw the eye.
Drawn
4. Draw how the image is formed if the eye sees an object at infinity.
Simple ray diagram with upside down image on retina. Mark the chief ray.
5. If the ray enters the eye at 1 degree, what is the height of the object that the eye sees?
Remember to calculate the refracted angle first (which I did not at first thanks to my frozen brain! But Professor guided me here). Then using basic trigonometry as you know the cornea length (24mm) you can calculate the height.
6. What is the resolution of the eye?
I said 1 arc minute which is the angular resolution but here, using the resolution equation $\Delta x = 1.22 \lambda f/D$, it had to be calculated. $f=17\text{mm}$. Do remember to change the angle into radians! I made the silly mistake of not doing it at 1st try but later I corrected it.
7. What are the sizes of rods/cones. A few micro metres (I made a wild guess here)
8. Do you know about spectrometer? Draw the diagram.
I drew the grating spectrometer.
9. Why do we use mirror in grating? What would have happened if we used lens?
Chromatic aberrations
10. Why does it occur?
Explain, but the word he was mainly looking for was dispersion.
11. How can find a solution to this?
Using achromats
12. Do you know about holography? Explain the difference in its image compared to the one taken by camera.
Diagram, 2D and 3D imaging.
13. What is the power your eye glass?
I said. And he identified it as short-sighted one. Here the conversation became more like a discussion. He compared my glasses with his ones which are made of progressive lens and had anti reflection coating. No questions were really asked.
14. Are you familiar with the term Bokeh? I was not, so he explained to me that it was about blurring the background of focused object.
15. How does the camera know about how to blur the background?
Here he 1st took out his phone which (later he showed me) had 2 camera side by side. He then took pictures and even let me take pictures consecutively to show how it could automatically take one full clear picture and next a Bokeh as you click twice focusing on same object. I had a hard time finding the answer here. But he helped here by drawing two lenses for the 2 cameras in the phone as shown below. He then asked me to draw the image created by an object by each of the lenses separately. Then he told me to repeat it by using a distant object. Turns out there comes an angular difference

on sensor screen with distance which the camera identifies comparing the images and blurs the background. The professor later said that this concept is very new but he ask such questions to motivate students to think analytically and learn something new. I don't think this question affected the grade for me.



General Comments

The exam was more of a discussion for me and lasted over 40minutes (while the person before me hardly has 20min). And the questions are very random. A lot of things depend on how you answer. So, it is important to answer to the point and to keep head cool (which I admit I had trouble with but the Prof. does help a lot to ease the environment). As for preparation, I found Hecht useful. I also used online resources such as wikipedia ,youtube lectures and of course the protocols!

Overall, it is a fun subject. Understand the basics and you will do great. All the best!