

## Oberlin College Physics 111, Spring 2024

### Final Exam Information

Monday, 6 May

The *final exam* will be given on Thursday, 16 May at 9:00–11:00 am in Wright 201. You may use one  $8\frac{1}{2}$  by 11 inch page with your own notes on both sides, but not your lab notebook, lab instructions, or any other material. No collaboration is permitted. There will be eight questions: four on topics from previous exams and four on the topics listed below.

The Maxwell term of Ampere's law  
Electromagnetic radiation  
Polarized light  
Fluids and pressure  
Thermodynamics, including laboratory calorimetry

*Study sessions:* There will be a HOOT session on Tuesday, 14 May at the usual time and place, but none on Sunday. There will be a conference session on Tuesday, 14 May at the usual time and place.

*Sample exam:* Here are some exam-type problems concerning fluids and thermodynamics. I guess it's a pretty broad clue that I can't think up any good exam-type problems concerning the Maxwell term and light.

I also suggest that you study the model solution to the "Network Circuit" problem from the second exam. It is posted under the "Assignments" section of the course web site.

- 77: *Rubber band work*

Answer: 107.0 J.

- 80: *Helium engine*

Answer:  $\epsilon = 1 - (T_L/T_H) = 1 - (273 \text{ K}/373 \text{ K}) = 0.268$ . Most of the information given — the working substance, the value of  $\gamma$ , the two volumes, the fact that it's a Carnot engine — is irrelevant.

- 82: *Stirling cycle*

Answer: **(a)** Total work done is  $nR(T_H - T_L) \ln(V_B/V_A)$ . **(b)** Because this is a cycle  $\Delta E_{\text{int}} = 0$  but  $\Delta E_{\text{int}} = Q - W$  so  $Q = W$ . Thus the total heat absorbed is the same expression as in part (a).

- 84: *Entropy change*

Answer:  $(k_D/3)(T_f^3 - T_i^3)$ .