

Bago University
Department of Physics
Second Semester Examination, September 2019

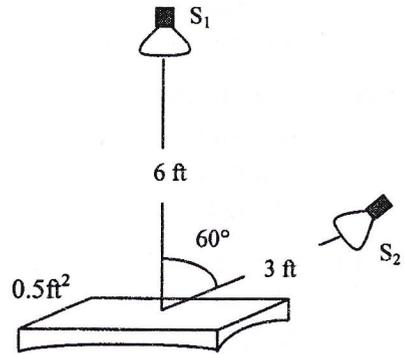
First Year (BSc)
(Chemistry, Mathematics & Geology Specializations)

Phys 1002
General Physics II
Time Allowed: (3) Hours

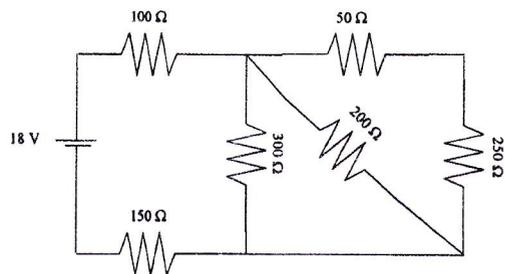
Answer any Six questions.

- 1 (a) What is the natural light source? Describe the most common light sources. Give a short note the study of phenomena using the wave nature of light. Write down the units for illumination and luminous intensity.
- (b) Define illuminance. A lamp with an intensity of 2000 cd is 4.0 ft directly above a radio on a repair bench. A television set is 3.0 ft to the side of the radio. What is the illumination of each?
- 2 (a) Write down the names of electromagnetic waves you have known. When orange light ($\lambda = 600 \text{ nm}$) is used for Young's experiment, the first-order bright fringe is observed 2.5mm from the center of the central maximum on a screen 1.0m from the slits. What is the slit width used in this experiment?

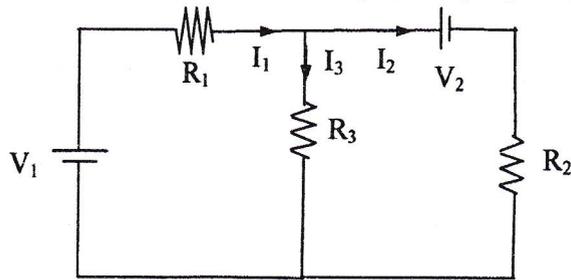
- (b) Suppose the light source S_1 in figure has an intensity of 2500 cd. What would be the required intensity of S_2 ? Is it produced an equal illumination on the surface? What would be the total flux on the surface?



- 3 (a) Is the equivalent parallel resistance always greater than the smallest resistance in the parallel arrangement? Explain.
- (b) Determine the voltage across, current through and power dissipated of the resistors in the given circuit.



- 4 (a) State Kirchhoff's rules. A slide-wire potentiometer has a wire length for the standard cell four times that of the wire length for an unknown cell for the balanced conditions. If a standard cell with an emf of 12.0V is used, what is the emf of the unknown cell? What would be the case if the unknown cell had an emf of 12.0V?
- (b) Compute the currents in the circuit below with $V_1 = 20 \text{ V}$, $V_2 = 6 \text{ V}$, $R_1 = 4 \Omega$, $R_2 = 1 \Omega$ and $R_3 = 5 \Omega$.



- 5 (a) What is the effect of two batteries in series with (i) opposite directional polarity, (ii) the same directional polarity? Distinguish between a rheostat and a voltage divider.
- (b) For resistances in parallel, how are the voltage drops across the resistance related to the voltage rise of the battery? What resistance should be connected in series with a $10\ \Omega$ resistor in a circuit with a 120V source so that a current of 2.4 A flows in the circuit?
- 6 (a) How many processes are there in thermodynamics system? What are they? Explain.
- (b) (i) What is the change in entropy when 65 g of ethyl alcohol vaporized at its boiling point of 85°C ? ($L_v = 200\ \text{cal/g}$)
- (ii) A heat engine absorbs 500 cal of heat and rejects 325 cal while doing work in a cycle. How many joules of work are done? What is the thermal efficiency of the engine?
- 7 (a) Distinguish between passive and active solar systems. How much energy does the sun radiate in one day? A single solar cell with an area of $5.0\ \text{cm}^2$ has an electrical energy output of $3.8 \times 10^4\ \text{kWh}$. If the solar energy density is $5.0\ \text{kWhm}^{-2}$, what is the efficiency of the cell?
- (b) (i) How many ways are there to reach solar radiation on the collection surfaces? What are they?
- (ii) An industrial plant in the southwest has a flat room measuring $300\text{ft} \times 200\ \text{ft}$. If the average daily energy surface density in the area is $1800\ \text{Btu ft}^{-2}$, how much solar energy is received by the roof in a week?
- 8 (a) Explain the thermosiphoning hot water system with illustration.
A business in midwest uses 1000 kWh of electrical energy a day. What area in (i) m^2 and (ii) ft^2 would receive an equivalent amount of solar energy on an average day? (iii) What would be the length of square collector in the case?
- (b) How many basic types of systems in solar heating and cooling? What are they?
The area of a sunbather's back is $3000\ \text{cm}^2$. How much energy in calories would the bather receive on the back when remaining in the sun light for 30 minutes? (Assume 50% of the insolation reaches the Earth's surface.)
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