Bago University
Department of Physics
Second Semester Examination, September 2019

First Year (BSc)
(Physics Specialization)

Phys 1102
General Physics II
Time Allowed: (3) Hours

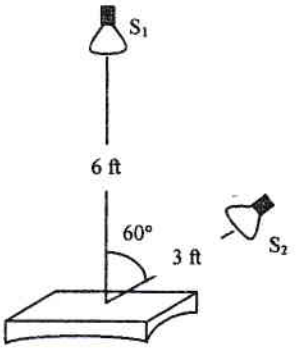
Answer any Six questions.

1 (a) What is polarization? How many types of polarization are there? Illustrate the polarization of light which is represented by the electric field vectors of a wave. Describe the optical phenomena that effected to the polarization.

(b) Young's double slit experiment is performed with monochromatic light, with a distance between the slits of 1mm and with the screen a distance of 1.2m from the slits. If the light having two component wavelengths are 400nm and 700nm, how far apart are the first order fringes of each component?

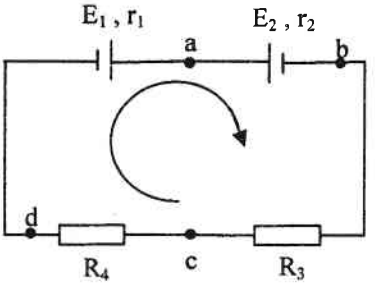
2 (a) (i) What is meant by illumination? Express the relation between the illumination and intensity.
(ii) Ultraviolet light has a wavelength of 300nm and infrared light has wavelength of 800nm. What are the light frequencies?

(b) A machine casting with a flat surface area of $0.5ft^2$ is illuminated by two light sources, as illustrated in figure, with $I_1 = 3400cd$ and $I_2 = 1000cd$ (i) what is the total illumination of the surface? (ii) If source S_2 is turned off and the casting is elevated 3.0ft, what is the illumination?



3 (a) How do you understand junction and branch?
A circuit with a 6V battery has a 3Ω resistor and a 15Ω resistor in series. What is the current through each resistor? What is the voltage drop across each resistor?

(b) In the given figure, $E_1 = 12V$, $r_1 = 0.2\Omega$, $E_2 = 6V$, $r_2 = 0.1\Omega$, $R_3 = 1.4\Omega$, $R_4 = 2.3\Omega$. Compute (i) the current in the circuit in magnitude and direction, and (ii) the potential difference V_{ac}.



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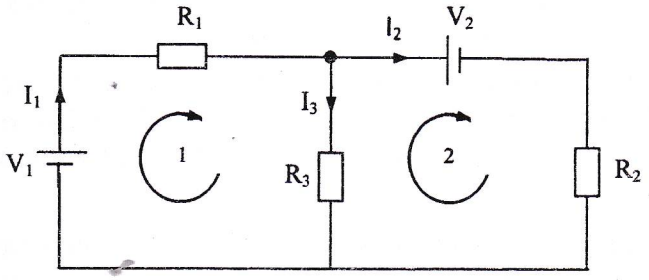
4 (a) What are the Wheatstone bridge circuit and the potentiometer circuit and write down their equations? Explain why a potentiometer is said to act as a voltage divider.

(b) 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. (i) If a standard cell with an emf of 12.0V is used, what is the emf of the unknown cell? (ii) What would be the case if the unknown cell had an emf of 12.0V?

5 (a) What are the physical principles involved in Kirchhoff's (i) voltage rule and (ii) current rule? What is the effect of two batteries in series with same directional polarity?

(b) Compute the currents in a circuit as in figure with $V_1 = 20V$, $V_2 = 6.0V$, $R_1 = 4.0\Omega$, $R_2 = 1.0\Omega$, $R_3 = 5.0\Omega$.



6 (a) State the second law of thermodynamics in words and symbols. Does heat flowing spontaneously from a colder body to a hotter body violate the first law? Explain.

(b) In an isobaric process, 25 kcal of heat is absorbed by a system of perfect gas. If the pressure of the gas is $2.0\times10^5 Nm^{-2}$ and the volume increases by 0.20 m^3, what is the change in the internal energy of the gas?

7 (a) In solar applications, is all of the radiation received direct sunlight? Explain.

(b) A minimum energy of 2.0×10^{-19} J is needed to free an electron in a solar sell. What wavelengths of light will not activate the cell?

8 (a) (i) Explain the principle of a solar cell. Why is this reverse effect of an LED?
(ii) How do you understand the greenhouse effect?

(b) A business in the midwest uses 1000kWh 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 lengths of the sides of a square collector in this case?