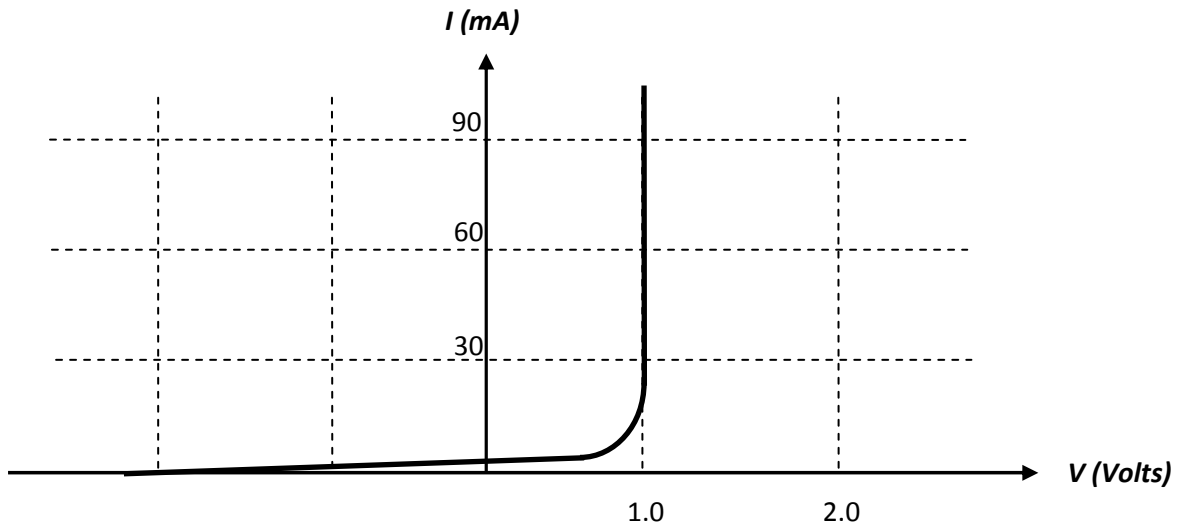


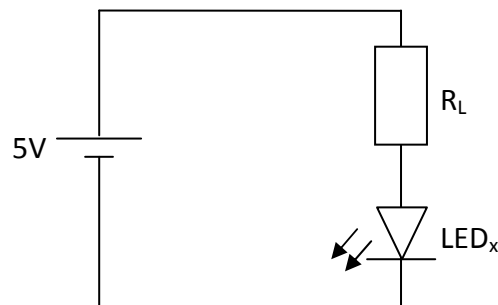
Exam Style Questions – Photonics

The following information relates to questions 1-2

The following graph shows the I-V characteristics of a particular light emitting diode (LED_x)



The LED is placed in the circuit below.

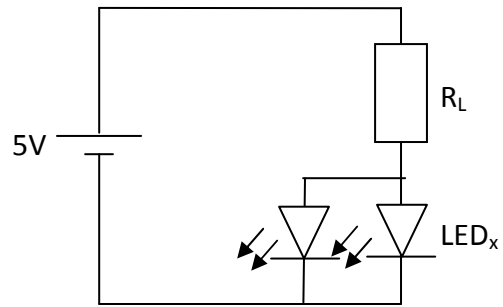


Question 1

Calculate the current through the LED if the resistance of R_L is 2 k Ω

2 marks

A second identical LED is placed in parallel with the first LED



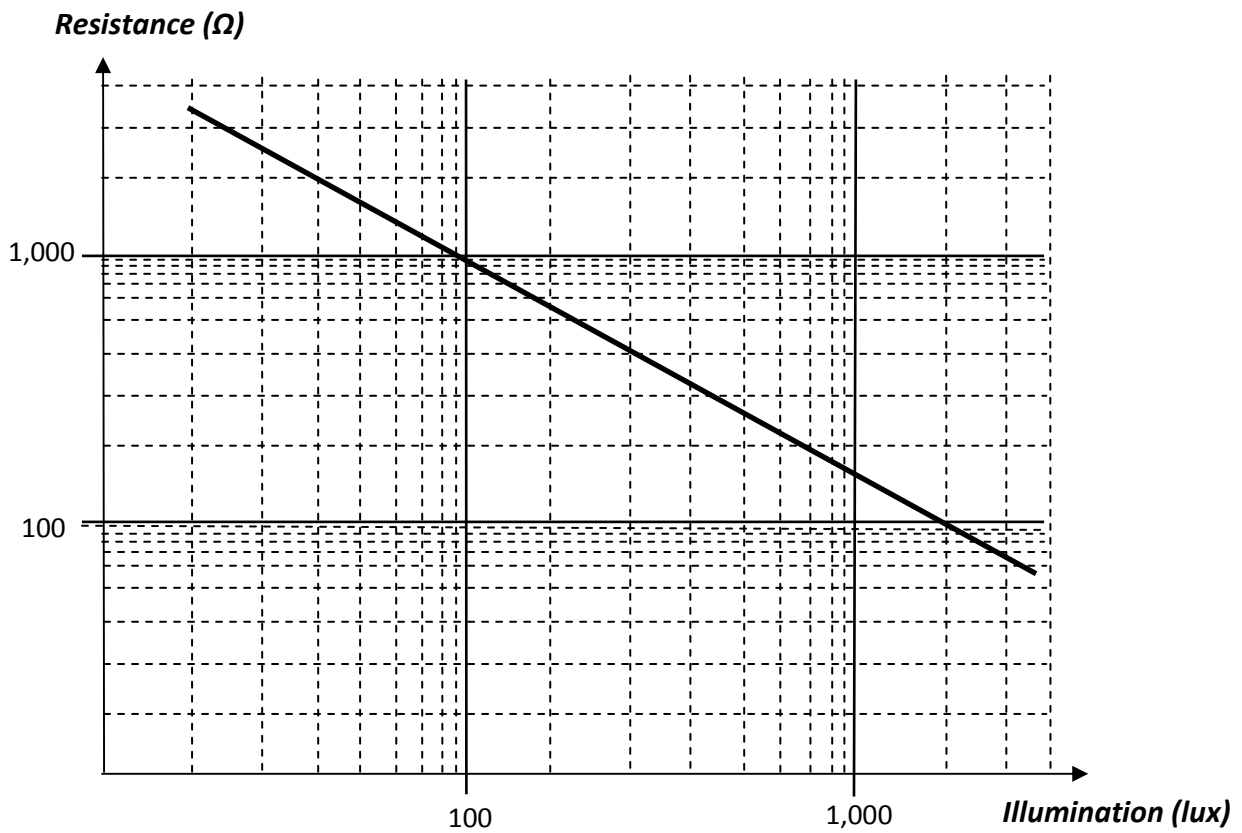
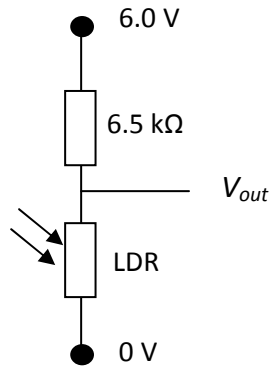
Question 2

Will the light output of the first LED increase, decrease or remain the same? Justify your response.

3 marks

The following information relates to questions 3-4.

A light dependant resistor is connected in series with a $6.5\text{ k}\Omega$ resistor to form a voltage dividing circuit. The circuit and the illumination – resistance characteristics of the LDR is shown below.



Question 3

What is the resistance of the LDR when the illumination is 300 lux.

1 mark

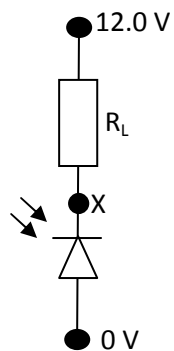
Question 4

Determine the illumination when the V_{out} is 1.41 V.

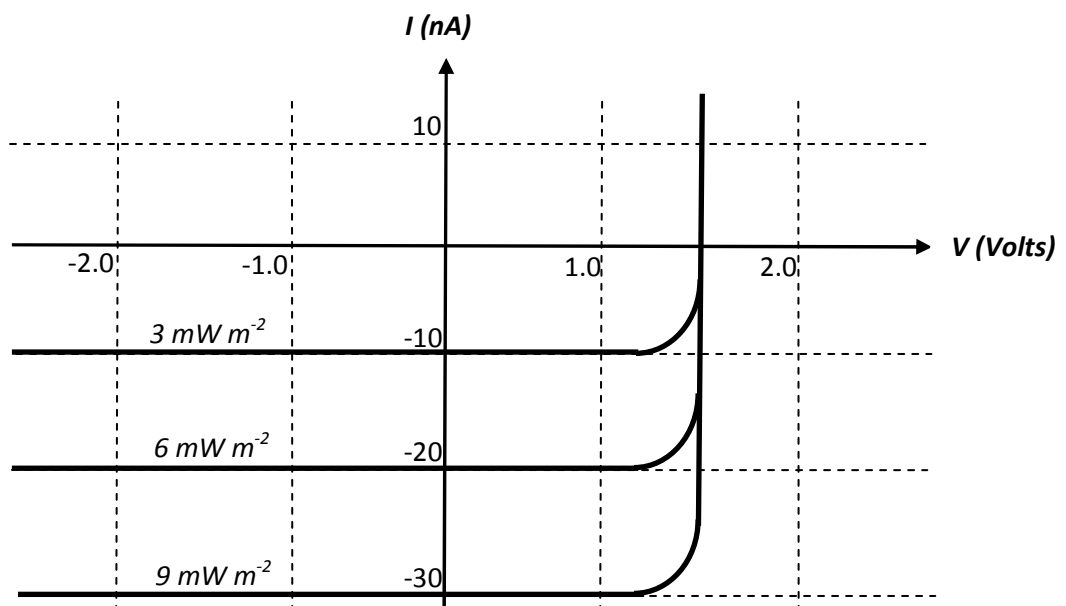
3 marks

The following information relates to Questions 5 - 7.

A photodiode is placed in series with the load resistor as shown in the diagram below.



The following graph shows the I-V characteristics for the photodiode is shown below.



Question 5

Is the photodiode in photoconductive or photovoltaic mode?

1 mark

Question 6

Calculate resistance of the load if we measure the light intensity at the photodiode to be 3 mW m^{-2} and the voltage between point X and earth is 2.0 V.

3 marks

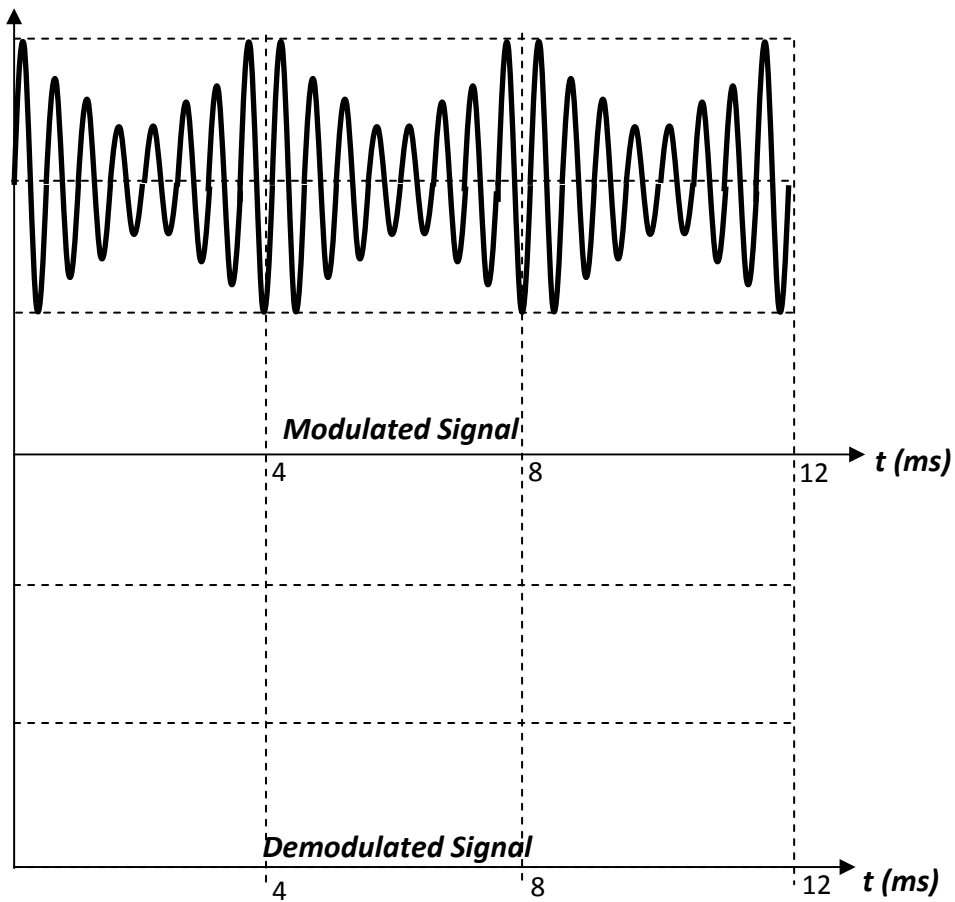
Question 7

What is illumination of the photodiode and if the potential difference across the load is 6.67 V.

3 marks

The following information relates to questions 8 and 9.

The graph below represents an optical carrier wave that has been modulated by a sound wave.



Question 8

In the space provided above, sketch the corresponding demodulated signal.

2 marks

Question 9

What is the frequency of the sound wave?

2 marks