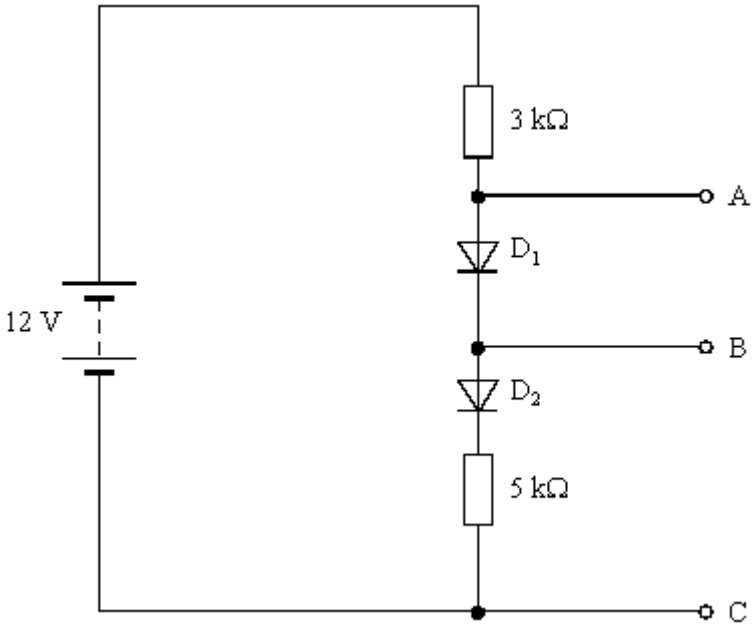
Name of the Student:_____
Max. Marks : 17 Marks **Time : 17 Minutes**

Q1.

The diagram below shows a series circuit containing resistors and silicon diodes.



(a) Calculate

(i) the voltage between A and C,

_____

_____

_____

_____

(ii) the voltage between B and C.

_____

_____

_____

_____

(4)

(b) A student connects diode D_2 the opposite way round to that shown in the diagram above.

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State, giving reasons,

(i) the new voltage between A and C,

_____

_____

_____

_____

(ii) the new voltage between B and C.

_____

_____

_____

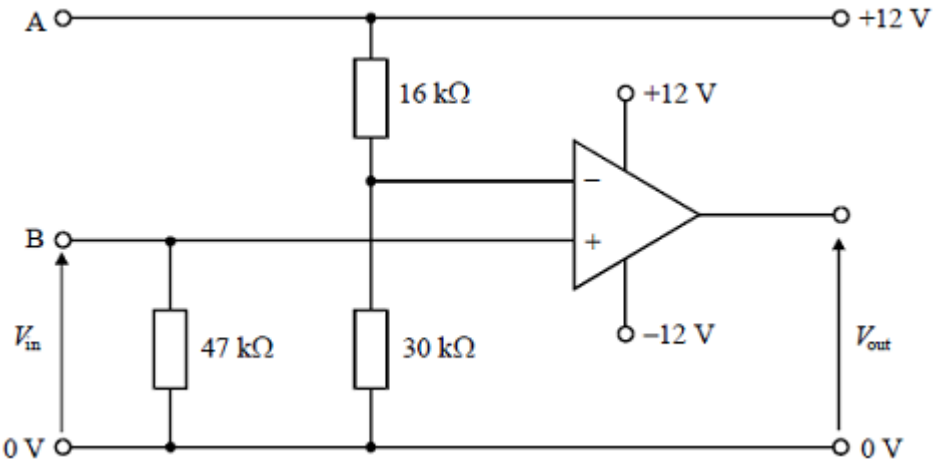
_____

(3)

(Total 7 marks)

Q2.

In the circuit shown, an ideal operational amplifier is used as a voltage comparator.



(a) The voltage V_{in} is steadily increased from 0 V. Calculate V_{in} when the sign of V_{out} changes from negative to positive.

_____

_____

_____

(2)

(b) (i) The op-amp is required to operate an LED. Add to the circuit an LED and its limiting resistor so that the LED lights when V_{in} is less than the value calculated in part (a).

(ii) Explain why the LED functions in the position you have drawn it.

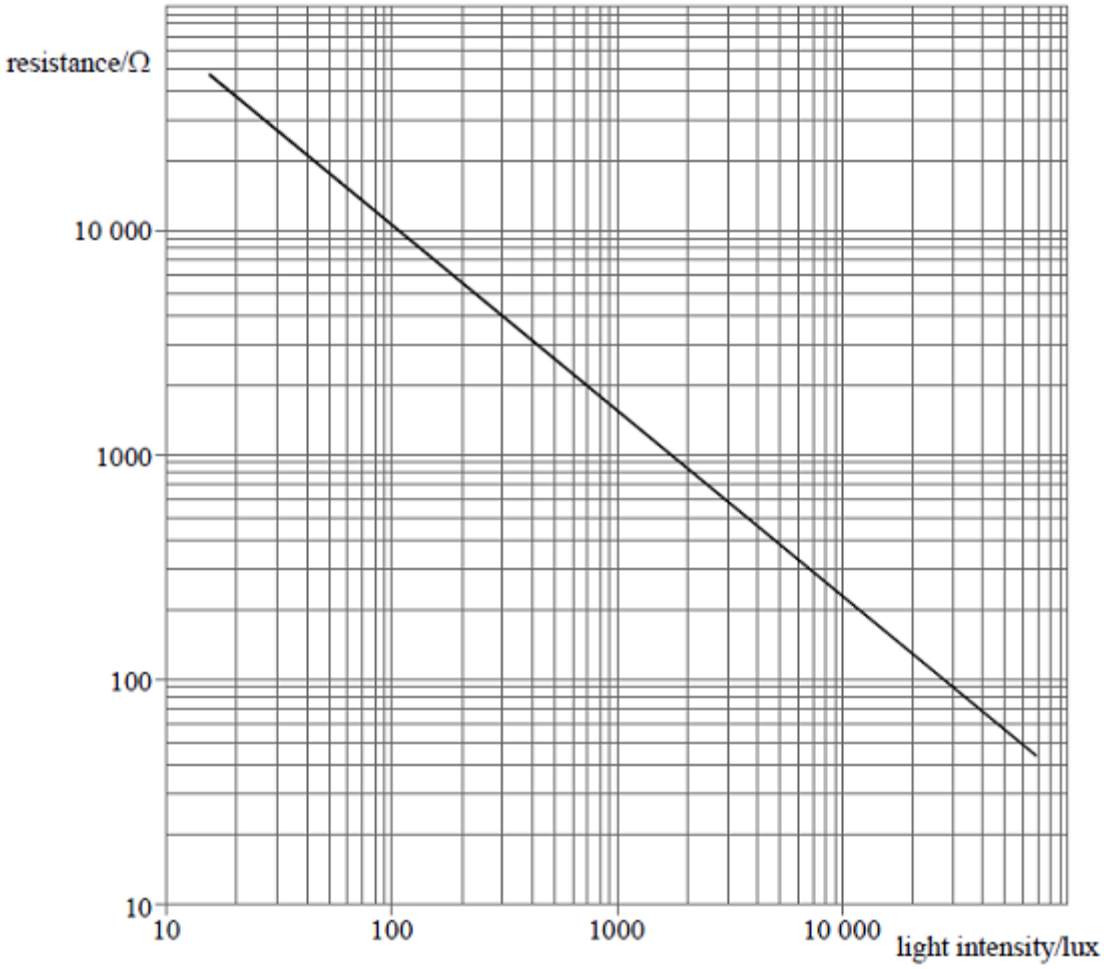
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(iii) Calculate the minimum value for the limiting resistor with the LED. Assume that the LED has a voltage drop of 2.0 V across it when emitting and a maximum current of 25 mA through it.

(5)

(c) An LDR is now connected between the points A and B in the circuit. The characteristic of the LDR is shown below.



Determine the light intensity at which the LED switches.

(3)

(Total 10 marks)

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