6) 5 amps

a) This current is not sufficient.
b) It would melt because there would be too much current

7) this is enough resistance to give a current of 50 mA
a) The multimeter shows 47 mA. The difference could be because of resistance in the wires or the uncertainty given on the resistor

PART II:

1)

a) The diode need to be oriented with the anode on the + side or it will not let current through.
b) The voltage drop across the resistor was 2.7 volts. This was expected because the diode box suggests it uses 2 volts. This depends on the resistance or energy emitted from the diode. The voltage drop across the diode is 2.12, and they add to around 5 because they are in series.
c) See above

2)
a) We expected that the brightness would increase for the LED because there was more current flowing through it (because of a lower equivalent resistance). However when we tried it, the red diode went out, since the current through was too big.

3)
a) For resistors of different values, trying on the blue diode, we saw that as the resistance increased, the brightness decreased.

4)
a) Switching to the 3.3 V pins but given the same resistance, we saw that the diode brightness decreased. We expected that that would happen, as the lesser voltage results in a lower current.

5)
a) We are now using the 47kOhm resistor.
b) As we use the step up circuit to increase the Rpi voltage to 10V the brightness should increase because there will be more current flowing through the LED, we saw this

6) The LED brightness changes could be quantified by the current flowing through the LED

7) For different LED's we could see that the voltage drop changed slightly between the different diodes. We saw that the 5V burned out the red diode, while it was perfectly fine for the blue diode. The blue and white were brighter than the red, and green and yellow were in the middle.

Photo diode:

1) LED to photo-diode
    a) Reverse bias (cathode to the negative side)
2) Voltage across the resistor is 3.5mV
3) If you cover the photodiode, the voltage decreases. If you shine more light on it, the voltage increases (though the amount itself is incredibly small)
    a) The voltage across the resistor when the photodiode is covered0.5mV = 0.0005V across 100 Ω so the dark current is 5*10^-6 amps through the photodiode (the current is the same through the resistor and photodiode
    b) Yes, 5V is enough to see a signal from the diode. When we changed it to 3.3V across 37000 we see 0.5V, still enough to see a signal of 0.014mA
    c) With step up: 0.7V across 37000ohm = 0.0189mA
    Without step up: 0.55V across 37000ohm = 0.015mA
    This shows a non linear relationship between applied voltage and current, but the current still increases with increasing voltage
4) Dark current: 2.9μA at 5V, Saturation current: 135μA at 5V