Question 6 **(5 marks)**

A new hadron consisting of three quarks is discovered in a particle accelerator experiment. Two of the quarks, an up and a bottom, have been identified. The overall charge on the hadron is determined to be +1 e.

(a) Identify a possible third quark. (1 mark)

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(b) Determine the quark composition of the hadron's anti-particle and its charge. (2 marks)

Composition: _____

Charge: _____

(c) The up quark in the hadron decays by the weak interaction into a down quark, a positron and a neutrino. Show that both charge and lepton number are conserved in this reaction. (2 marks)

$$u \rightarrow d + e^{+} + \nu_e$$