2. **B)**

i) Operators that commute with the Hamiltonian are associated with conserved quantities. Given this, show that the time-independence of the laws of physics leads to energy conservation. **{4}**

ii) Define *helicity*. Why is this concept more important for massless than for massive particles? **{3}**

iii) Show that the observed massless neutrino states violate parity but are compatible with the combined charge conjugation and parity operations. **{3}**

iv) Draw a Feynman diagram to show how a K^0 can change into a $\overline{K}^0$. **{3}**

v) Describe the CPLEAR experiment that measured T violation. Include in your answer Feynman diagrams and a sketch of the experimental detector to illustrate how the initial state was produced and how the final states were detected. **{8}**

vi) Why is it important to study CP (or T) violation in nature, as compared with P violation on its own? **{3}**