



2. **Magnetic moment – Magnetic moment** (10)

Hvert er segulvægi atóms í ástandinu  ${}^3P_0$  ? (Lítið framhjá áhrifum kjarna).

What is the magnetic moment of an atom in the state  ${}^3P_0$  ? (Disregard nuclear effects).

(Próf Apríl 2020)

3. **Hverfiþungi – Angular momentum** (10)

Hvaða segir táknumin  ${}^3F_4$  um hverfiþunga atóms ?

What information does the term symbol  ${}^3F_4$  provide about the angular momentum of an atom ?

(Próf Apríl 2020)

4. **Assign quantum numbers** (10)

In an atom which obeys  $LS$  coupling, the separations between adjacent energy levels of increasing energy in the five levels of a particular multiplet are in the ratios 1:2:3:4. Assign the quantum numbers  $S$ ,  $L$ , and  $J$  to these levels.

5. **The Zeeman Effect** (10)

A collection of hydrogen atoms is placed in a magnetic field of 3.50 T. Ignoring the effects of electron spin, find the wavelengths of the three normal Zeeman components

(a) of the 3d to 2p transition

(b) of the 3s to 2p transition

6. **Fine Structure** (10)

Calculate the wavelengths of the components of the first line of the Lyman series, taking the fine structure of the 2p level into account.