2. **B)** You set out to detect W decays at CDF, a detector constructed to examine the collisions of protons and antiprotons at the Tevatron at Fermilab.

(i) Draw a diagram for producing a W^+ from a proton-antiproton collision. **{2}**

(ii) Write down five Feynman diagrams with the same initial state but different final states for the dominant decays of the W^+. **{5}**

(iii) Sketch a 30-degree portion of a cross-sectional view of the major components of the CDF detector. **{4}**

(iv) Describe how the W^+ would be detected in the CDF detector for two of the six modes described above. Choose one mode that is difficult to observe and one mode that is relatively easy. Explain your choices. **{6}**

A colleague has become very excited, believing his analysis showed that there is a new physics discovery indicated by a single jet and a large amount of missing transverse momentum.

(v) Explain why your colleague thinks this is something new by describing one example of how jets are produced in proton-antiproton collisions. Start with the Feynman diagram for one case and describe the process for the production of particles composing the jets observed in CDF . **{4}**

(vi) Describe a mode of the W^+ decay that your colleague may have found. **{3}**