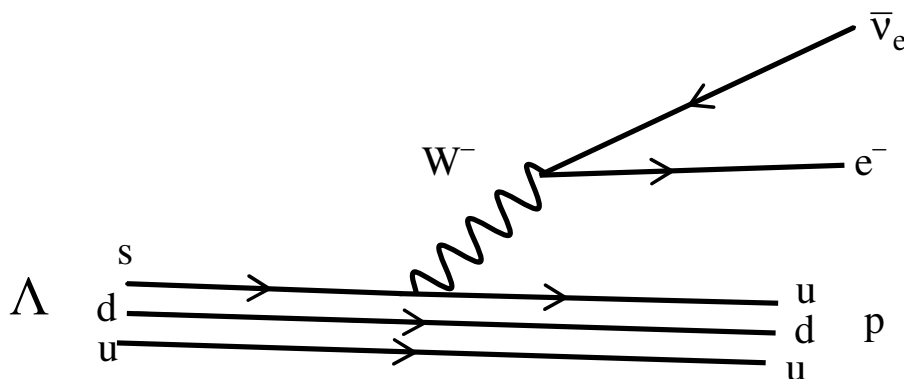


It is not departmental policy to provide complete specimen answers to past examination papers. However, to help you in revision, numerical values and similar information are given below so that you can check your attempts. If you have attempted past questions and wish to discuss the descriptive questions or the details of your calculations, please see me!

Dr Booth

Question 1

d)



e) b quark has spin $\frac{1}{2}$, isospin 0, charge $-\frac{1}{3}$ and b quantum number -1 .

f) Quark content $u\bar{c}$.

g) Hadron cross section 40 nb.

i) Weak interaction, as strangeness changes.

j) Strong and electromagnetic interactions are invariant under C.

Question 2

b)i) Possible spin wavefunctions: $\uparrow\uparrow$, $\frac{1}{\sqrt{2}}(\uparrow\downarrow + \downarrow\uparrow)$, $\downarrow\downarrow$.

c)i) Strong – hadrons involved, all qu. nos. conserved.

c)ii) Forbidden – μ lepton number not conserved.

c)iii) Weak – change of strangeness by 1 unit.

c)iv) Forbidden – baryon number not conserved.

c)v) Electromagnetic – photons involved (all qu. nos. conserved).

c)vi) Electromagnetic (electroweak at high energy). Charged leptons involved.

c)vii) Strong – hadrons involved, all qu. nos. conserved.

c)viii) Forbidden – change of strangeness by 2 units.

Question 4

c) Energy of D was 3739 MeV.

Question 5

c)
$$F(\underline{q}) = \frac{12\hbar^3}{q^3 R^3} \left(2 \frac{\hbar}{qR} \left(1 - \cos \frac{qR}{\hbar} \right) - \sin \frac{qR}{\hbar} \right).$$