Assess Quizzes from the o-book – Explanations for the answers.

Chapter 14 Review – Support

Q	Reason
1	Quarks are not conserved. For example, when a proton encounters an antiproton, one of its constituent valence **quarks** may annihilate with an antiquark, while the remaining **quarks** and antiquarks will undergo rearrangement into a number of mesons (mostly pions and kaons), which will fly away from the annihilation point. Just learn there is no law of conservation of quarks. The other three options are correct.
2	The antiup quark has a baryon number of -1/3. The antimuon is not a constituent of baryons so has a baryon number of 0.
3	B(uud) = $\frac{1}{3}$(3 - 0) = +1. B ($u\bar{d}$) = $\frac{1}{3}$(1 - 1) = 0
4	If it is not a lepton its L = 0. So, the baryon *uud* and the meson $c\bar{s}$ have L = 0. The muon μ- and tauon τ- particles both have an L = +1 because they are the regular leptons. The antileptons, the antimuon μ+ and antitauon τ+ particles both have an L = -1 because they are the antileptons.
5	*uds* is a baryon as the questions says, so it must have a L = 0.
6	As described on page 385 of NCPQ U3&4 and in the syllabus. You need to learn these diagrams off by heart.
7	Read from left to right. Notice that the electron and positron approach each other as the move to the right. They don't annihilate because there is no break in the e- line, or in the e+ line. If they did annihilate, they would disappear and turn into a photon (2 photons actually but this is represented by only one wavy line in the Feynman diagram).
8	A meson is made of a quark and an antiquark. B ($q\bar{q}$) = $\frac{1}{3}$(1 - 1) = 0
9	B($\overline{ddc}$) = $\frac{1}{3}$(number of quarks – number of antiquarks) = = $\frac{1}{3}$(0 - 3) = -1
10	Charge dds = $(-\frac{1}{3}) + (-\frac{1}{3}) + (-\frac{1}{3}) = -1e$. The 'e' just means it is the elementary charge.

Chapter 14 Review – Consolidate

Q	Reason
1	A tau neutrino is a lepton so it has an L = (1 – 0) = +1
2	baryon number for reactants = baryon number for products; lepton number for reactants = lepton number for products

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3	Reactants in the correct answer have a total of 11 nucleons which equals 33 quarks. Products have 11 nucleons = 33 quarks. Conserved.
4	The baryon numbers for the answer are: +1 + +1 = +2. The product has a B = 0 so baryon number is not conserved so the reaction is not allowable. Please note: the option that says: $2\Xi^0 \rightarrow \Omega^-$ should read $\Xi^0 \rightarrow \Omega^-$. The question should read: Which one of the following reactions does not obey the law of baryon conservation? $\Omega^- + \Xi^0 \rightarrow K^-$ [does not obey, thus correct answer] $\Xi^0 \rightarrow \Omega^- + K^-$ [obeys, thus incorrect answer] $\Xi^0 \rightarrow \Omega^-$ [obeys, thus incorrect answer] $\Omega^- \rightarrow \Xi^0 + K^-$ [obeys, thus incorrect answer]
5	Has to show an electron that turns into an electron plus a photon being given off.

Chapter 14 Review – Extend

Q	Reason
1	$B_R = 0$, $B_P = 0 + 0 + 0 = 0$. $L_R = +1$, $L_P = +1, -1, +1 = +1$. Both B and L are conserved.
2	$B_R = 0$, $B_P = 0 + 0 = 0$ B not conserved). $L_R = 0$, $L_P = 0, -1 = -1$. Neither B nor L are conserved. Thus conservation of B and L is violated (not allowed).
3	Only $\bar{\nu}_\tau$ has B = 0 (not a quark) and L = -1 (antineutrino)
4	When you change a particle to its antiparticle the only thing that changes is the charge becomes the opposite. We can say that there is charge reversal symmetry.
5	Crossing symmetry (X) occurs when a particle is changed to an antiparticle and placed on the opposite side. In the answer note that the muon as a reactant changes into an antimuon as a product. The electron product becomes a positron reactant. The electron antineutrino product becomes a neutrino reactant. A muon neutrino product becomes a muon antineutrino reactant.