Q. 3) Write down the quark combination for antiproton & antineutron.

Ans: Antiproton has a quark combination of $\bar{u}\bar{u}\bar{d}$.

$$\text{Charge, } Q = -\frac{2}{3}e - \frac{2}{3}e + \frac{1}{3}e = \text{-1e}$$

Or, $-\frac{2}{3} - \frac{2}{3} + \frac{1}{3} = -1$

$$\text{Baryon number, } B = -\frac{1}{3} - \frac{1}{3} - \frac{1}{3} = -1$$

$$\text{Lepton number, } L = 0 + 0 + 0 = 0$$

Thus, antiproton is made of quark combination of $\bar{u}\bar{u}\bar{d}$.

Next,

Antineutron has a quark combination of $\bar{u}\bar{d}\bar{d}$

$$Charge, Q = -\frac{2}{3} + \frac{1}{3} + \frac{1}{3} = 0$$

$$Baryon\ number, B = -\frac{1}{3} - \frac{1}{3} - \frac{1}{3} = -1$$

$$\text{Lepton number, L} = 0 + 0 + 0 = 0$$

Thus, antineutron is made of quark combination of $\bar{u}\bar{d}\bar{d}$.

Q. 4) What are the similarities & differences between a neutrino & Photon

Ans:

Similarities between a Neutrino & a Photon:
1. Both are the parts of Standard Model of Particle Physics.
2. Both of them have zero charge & rest mass.
3. Both of them has zero Baryon number.

Differences between a neutrino & a photon:

Neutrino	Photon
1. It is a part of matter with small mass.	1. It is a part of force carrier with zero mass.
2. It is a Fermions and hence it obeys Fermi- Dirac statistics.	2. It is a Boson and hence it obeys Bose-Einstein Statistics
3. It has 1/2 spin.	3. It has spin 1.

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