Chapter 4 Nuclear model and stability. (Revision Questions page 153). Multiple Choice Answers

Q	Ans	Explanation
1	A	Note that it is decreasing strength. That means from strongest to weakest. You need to learn this order. In Unit 3 you will see there is a fourth force called "weak force" that fits between electromagnetic and gravitational. See NCPQ U3 & 4 Chapter 13.2 page 360.
2	C	Isotopes have the same number of protons (same Z) but different numbers of neutrons. This means that its mass number (A) which is the sum of protons and neutrons will be different.
3	B	${}^{56}_{26}Fe$ has 26 protons and 30 neutrons. Its mass number (A) is 56 which is the sum of protons and neutrons. These protons and neutrons are called nucleons so there are 56 nucleons. If we divide the binding energy of 492 MeV by 56 we get 8.8 MeV/nucleon.
4	A	A nucleon is either a proton or neutron. If we add one neutron the atomic number (Z) will stay the same at 92 as the atomic number is the number of protons (which didn't change). Thus, its symbol will stay as U. The extra neutron will increase its mass number from 239 to 240 so it will be ${}^{240}_{92}\mathrm{U}$. If we add one proton the atomic number (Z) will become 93 and the mass number (Z) will become 240. As it has an atomic number of 93 it will be neptunium (Np) so its formula will be ${}^{240}_{93}\mathrm{Np}$.
5	C and D	Too many protons compared to neutrons, or vice versa will cause instability. Where p >> n we get beta positive decay, and where n>>p we get beta negative decay. The cause of this can be explained thus: as the number of protons increases the magnitude of the electromagnetic repulsion also increases. The strong nuclear force between nucleons would also increase as it is between any type of nucleon (proton or neutron). As the number of neutrons increases however, the electromagnetic repulsion would become less as the protons are pushed further apart, but the strong nuclear force would still increase as the number of nucleons increased. Thus, increasing the number of protons would make the nucleus increasingly unstable and lead to beta positive decay to get rid of protons by turning them into neutrons. Increasing the number of neutrons would increase the stability to a point, but even too many neutrons would result in more instability (leading to beta negative decay). So, both answers are correct.