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**NATIONAL OPEN UNIVERSITY OF NIGERIA**

**14-16 AHMADU BELLO WAY, VICTORIA ISLAND LAGOS**

**SEPTEMBER/OCTOBER 2015 EXAMINATION**

**SCHOOL OF SCIENCE AND TECHNOLOGY**

**COURSE CODE: PHY 409**

**COURSE TITLE: ELEMENTARY PARTICLE PHYSICS**

**Time: 2hrs**

**Instructions: Answer any five questions**

1. (a) Draw a table showing the elementary particles (not antiparticles) according to their families with the following properties: symbol, charge, and spin. (b) Differentiate between a lepton and a meson giving names of particles and some properties.
2. In a tabular form write down the intermediate bosons and their properties.
3. The mass of the W+ boson is 80.400 MeV/c2 , Calculate the range of the weak interaction.
4. Show that all the conservation laws are obeyed by using the interaction equations, (a) **p + n →p+ p + π- (b) p + n →π++ πo.** Hence state which equation can occur in nature and which that cannot occur in nature.

5. (a) State the CPT theorem of quantum field theory. (b) Show that in the presence of a free magnetic monopole the force law is not invariant under parity transformation.

6. Consider force of gravity on a mass m1, located at r1 due to a mass m2located at r2. (a) State Newton’s law of gravity. (b) Use the parity transformation to show that the law of gravitation is invariant under parity.

7. Explain briefly the term strangeness. Using the strangeness quantum number assigned to each hadrons classify the following collision of a negative pion and a proton

p - + P $\rightarrow Σ^{+}$ + K+andp - + P$⟶Σ^{+}$+ K- into being possible or forbidden in nature.