



NATIONAL OPEN UNIVERSITY OF NIGERIA
PLOT 91, CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESSWAY, JABI - ABUJA
FACULTY OF SCIENCES

DEPARTMENT OF PURE AND APPLIED SCIENCE

OCT/NOV 2019 EXAMINATIONS

COURSE CODE: PHY 401
COURSE TITLE: ELEMENTARY PARTICLES PHYSICS
CREDIT UNIT: 3
TIME ALLOWED: (2½ HRS)

INSTRUCTION: *Answer question 1 and any other four questions*

QUESTION 1

- a. What is an elementary particle? [3 marks]
- b. Write down the equation for the collision between a proton and a proton in an accelerator. [2 marks]
- c. List six detectors that can serve as the gaseous ionization detector. [3 marks]
- d(i). State the law of conservation of angular momentum. [2 marks]
- (ii). Using the decay of a K^+ meson at rest, express this law of conservation of angular momentum. [5 marks]
- e. Explain the Charge Parity Time (CPT) reversal's theorem. [4 marks]
- f. What is the relationship between Hypercharge and Strangeness? [3 marks]

QUESTION 2

- ai. State the law of conservation of Charge [1 mark]
- ii. Why is an isolated electron stable? [3 marks]
- b. List four Solid State detectors. [4 marks]
- c (i). What are the two major classifications of elementary particles? [2 marks]
- ii. What is the major distinction between the two classifications of elementary particles? [2 marks]

QUESTION 3

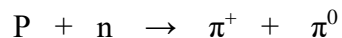
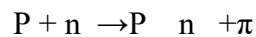
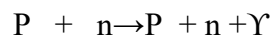
- a. What are Quarks? [2 marks]
- b. Write two types of quarks with symbols. [2 marks]
- c. Highlight their corresponding antiquarks with symbols [2 marks]
- d. State the charges of four quarks and four antiquarks [6 marks]

QUESTION 4

- ai. What are the Leptons? [2 marks]
- ii. Name 2 classes of Leptons [0.5 mark]
- b. What are the Hadrons? [2 marks]
- c. Using a table, distinguish between the different families of Leptons in terms of symbols, and charge [7.5 marks]

QUESTION 5

- a. Write down 4 properties of hyperons [4 marks]
- bi. State the law of conservation of Baryon number. [2 marks]
- ii. Assign Baryon number to the following particles $-\Upsilon, \nu, e, \mu, k, \pi, p, n$ [2 marks]
- c. Which of these reactions can occur in nature using the conservation law of baryon number. [4 marks]

**QUESTION 6**

- a. Briefly explain the term Parity. [4 marks]
- b. Mention 2 similarities and 2 differences between C and G parity [4 marks]
- c. Give the intrinsic parity of the following: the proton, pion, kaon, Lambda. [4 marks]