NATIONAL OPEN UNIVERSITY OF NIGERIA
UNIVERSITY VILLAGE, PLOT 91 CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESS WAY, JABI - ABUJA.
FACULTY OF SCIENCES
DEPARTMENT OF PURE AND APPLIED SCIENCE
2022_2 POP EXAMINANTION

COURSE CODE: **CHM 406**
COURSE TITLE: **Nuclear and radiochemistry**
COURSE UNIT: **2**
TIME: **2 Hours**
INSTRUCTION: **Answer question one and any three questions.**

QUESTION ONE

1a. Compare and contrast the ordinary chemical reaction with nuclear reaction. 6 mks

1b. Write short explanation notes on

i) Natural radioactivity (3 mks) (ii) Artificial radioactivity (3 mks) (iii) Electron capture (3 mks)

1c. Write brief explanatory notes on Ionization chamber.
3 mks

1di. The nucleus of an atom is dense explain. 2 mks

1dii. $^{97}_{40}Zr \rightarrow {}^{97}_{41}Nb + ?$ 2 mks

1e. Explain extensively the effect of radiation on human health 3 mks

QUESTION TWO

2a. Show with examples the rule that guide prediction of nuclear stability. 4 mks

2bi. Complete and balance the equations below

i) $^{2}D_1 + {}^{3}T_1 \rightarrow {}^{4}He_2 + ? + \text{Energy} + \gamma \text{ ray}$ 2 mks

ii) $^{4}He_2 + {}^{14}N_7 \rightarrow {}^{1}H_1 + ?$ 2mks

2bi. Describe Beta ray. 3 mks

2c. In what proven ways has larger dose radiation occurred? 4 mks

QUESTION THREE

3a. With two supporting relevant equation, explain Gamma (γ) ray emission. 8 mks

3b. Explain what you understand by chain reaction. 4 mks

3c. Write short note on Proportional counter. 3 mks

QUESTION FOUR

4a. With simple chemical equation explain the type of reaction that occur in the sun. 4 mks

4b. In simple term explain the main function of a fusion reactor. 2 mks

4c. In nuclear models reactions, the facilitator intends to achieve certain objectives, list them 5 mks

4d. What does the symbol Q represent in the particles below?

(i) ${}^{0}_{-1}Q$ (2 mks) (ii) ${}^{4}_{2}Q$ (2 mks)

QUESTION FIVE

5a. List some human health challenges and radio nuclear treatment option. 8 mks

5b. Explain briefly the management of radioactive waste and associated problems. 7 mks