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 SCIENCES

JANUARY/FEBRUARY 2018 EXAMINATION

COURSE CODE: **CHM406**

COURSE TITLE: **Nuclear and radiochemistry**

TIME: **2 Hours**

INSTRUCTION: **Question one is compulsory. Answer question one and any other three questions.**

QUESTION ONE

1a) Compare and contrast between chemical and nuclear reactions (8 mks)

1b) Describe briefly the three possible processes that could result from the interaction of an atomic particle with an atomic nucleus? (3mks)

1c) Write short notes on the use of radioactivity in each of the followings:

i. Archeology/Environmental studies

ii. Medicine (11 mks)

1d) What is a chain reaction? Explain briefly.(3mks)

QUESTION TWO

2a) A neutron-rich nucleus is bound to undergo certain transformations. Explain; and describe any emission involved. ($8^1/_2$ marks**)**

2b) Identify and discuss the radioactive process in the chemical equation below

$^{238}_{92}U \; ^{234}_{90}Th + \; ^{4}_{2}He$ ($6^1/_2$ marks)

QUESTION THREE

3a) Complete the following nuclear reactions using the symbol X to represent the new element formed or particle involved.

i. $^{38}_{19}K \longrightarrow X + {}^{0}_{+1}\beta$

ii. $^{106}_{47}Ar + X \; {}^{106}_{46}Pd \longrightarrow$

iii. $^{97}_{40}Zr \longrightarrow X + {}^{0}_{-1}\beta$

iv. $^{99}_{43}TC \longrightarrow X + {}^{0}_{0}\gamma$

v. $^{198}_{86}Rn \longrightarrow X + {}^{4}_{2}He$

(15 mks)

QUESTION FOUR

Expatiate on each of the followings:

i. Nuclear fission
ii. Nuclear fusion
iii. Nuclear fusion reactor(15 marks)

QUESTION FIVE

5a)Enumerate the general precautionary measures that must be taken against excessive radiation exposure in a radiation laboratory.($10^{1}/_{2}$ marks)

5b) What are the effects of excessive radiation exposure on human beings? ($4^{1}/_{2}$ marks)