NATIONAL OPEN UNIVERSITY OF NIGERIA
14-16 AHMADU BELLO WAY, VICTORIA ISLAND LAGOS
MARCH/APRIL 2016 EXAMINATION

SCHOOL OF SCIENCE AND TECHNOLOGY

COURSE CODE: CHM406
COURSE TITLE: NUCLEAR AND RADIOCHEMISTRY

TIME ALLOWED   2HOURS

ANSWER QUESTION ONE AND ANY OTHER THREE QUESTIONS
QUESTION 1 COMPULSORY (25marks)

(ai) What are Tracks? (2mks)
(ii) State the three properties of track. (3mks)
(iii) Mention the main types of solid state nuclear track detector (SSNTD).(2mks)
(b) Explain briefly the following forms of gas counter track measurement stating clearly their uses. (9mks)
(i) Geiger muller counter
(ii) Ion chamber
(iii) Proportional counter
(ci) Explain the terms(i) Scintillating counting technique (ii) Radiological dating (iii) Radioactive carbon. (6mks)
(d) E = mc^2. Identify each term in this equation.(3mks)
QUESTION 2
Copy and complete this table of abundance of naturally occurring nuclides.(12mks)

Number of particles	Even/ Odd	Even/ Odd	Even/ Odd	Even/ Odd
Number of protons	?	?	?	?
Number of neutrons	?	?	?	?
Number of such nuclides	?	?	?	?

(b) Define the following terms:
(i) Decay energy.(1mk)
(ii) Atomic energy. (1mk)

(iii) Radioactivity. (1mk)

Question 3
(3a) Outline the three rules that guide the prediction of nuclear stability.(6mks)
(bi) Mention any five general principles by which the health aspect of radiation control are satisfied.(5mks)
(ii) Write short notes on the two types of exposure to large dose radiation. (4mks)

Question 4
 Explain briefly the following concept
a. **Quenching. (2mks)**
b. **Radioactive decay. (2mks)**
c. Elastic scattering.(5mks)
d. Thermal neutron. (2mks)
e. Moderation.(2mks)
f. Chain reaction.(2mks)

Question 5
Write short notes(representing with an equation where necessary) on each of the following:
   a. Beta decay.(3mks)
   b. Alpha decay.(3mks)
   c. Positron decay.(3mks)
   d. Gamma decay.(2mks)
   e. Nuclear fusion.(2mks)
   f. Nuclear fission.(2mks)

Question 6
a.   **Identify the symbol X in each of the following**
i) $^0_{-1}X = ?$ (ii) $^4_2 X = ?$ (iii) $^0_{+1} X = ?$ (iv) $^1_0 X = ?$ **(2 marks)**
b)   List and write short notes on the basic principles recommended for keeping radiations exposure to a minimum level   (6 marks)
c) Discuss the protection of radiation measures in large organisation   (6 marks)

d) Mention the types of sample preparation in radiation measurement.(1mk)