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MAIN EXAMINATION

JANUARY – APRIL 2022

FACULTY OF SCIENCE

DEPARTMENT OF NATURAL SCIENCES

REGULAR PROGRAMME

PHY 412: RADIATION PHYSICS

Date: APRIL 2022	**Duration: 2 Hours**
INSTRUCTIONS: Answer Question ONE and any TWO Questions	

Q1.

a. i. With suitable examples differentiate between positron decay and alpha decay **(6marks)**

b. Predict the nature of nuclear changes(s) each of the following nuclides is likely to undergo giving a reason for your answer: **(4marks)**

i. $^{12}_{5}B$

ii. $^{234}_{92}U$

c. What is the importance of the Bohr's model of the nucleus in radiactivity **(4marks)**

d. Explain any three types of how radioactivity decay **(6marks)**

e. Explain the how tunnelling occurs **(4marks)**

f. Outline the properties of beta decay **(3marks)**

g. Differentiate between radiations and radioactivity **(3marks)**

Q2.

a. Explain the general principles of the application of nuclear radiation to problems in mining, industry, medicine and the environment **(20marks)**

Q3.

a. Discuss any two types of accelerators **(4marks)**
b. Explain the different nuclear analytical methods **(6marks)**
c. Explain methods involved in radiation Shielding and protection **(10marks)**

Q4.

a. Explain how radioactivity is used in the following cases: **(12marks)**
   i. Positron-emission
   ii. Radioactive tracers
   iii. Carbon-dating
b. What is a nuclear fuel. **(2marks)**
c. How is Uranium enrichment achieved **(6marks)**

Q5.

a. Differentiate between somatic and genetic damage caused by radioactivity **(4marks)**
b. Explain what is photo nuclear reaction process **(2marks)**
c. Explain the common processes causing Attenuation **(12marks)**

END