

NATIONAL OPEN UNIVERSITY OF NIGERIA

OCTOBER 2017 EXAMINATION

COURSE CODE: SED 323 (2 Units)

COURSE TITLE: PHYSICS FOR INTEGRATED SCIENCE III

Time Allowed: 2 Hours

Instructions: Answer question number one (1) and any other three (3) questions.

1a). Define **ampere** in terms of the force between two parallel, long, straight wires carrying a current in a vacuum. **(5 marks)**

b) Find the force on a 50cm long wire carrying a current of 10A in a uniform magnetic field of 0.35T if the wire lies at an angle of 60° to the field.

(7 marks)

C) Write short notes on the following:

i. Alpha particle (α) (2 marks)

ii. Beta particle (β) (2 marks)

iii. gamma rays (γ) (2 marks)

d) Iodine 131 has a half-life of 8.05 days. Calculate the decay constant.

(7marks)

(Total marks = 25 marks)

2. (a) i. Explain the following:

i. Magnetic flux. **(2.5 marks)**

ii. Flux linkage. **(2.5 marks)**

2(b). A transformer with 5000 turns in its primary is used between a 120V a.c supply and a 200V kettle. Calculate the number of turns in the secondary.

(10 marks)

(Total marks = 15)

3a. A coil rotates at a constant speed in a uniform magnetic field. The peak value of the induced e.m.f. in the coil is 10V. Calculate the root mean square e.m. f.

(9 marks)

b). Explain the changes that occur in the nucleus during radioactive decay.

(3 marks)

c) Using α - particle emission concept and equations, explain **parent nucleus** and **daughter nucleus**. **(3 marks)**

(Total marks = 15 marks)

4a. State Faraday's law of electromagnetism. **(5 marks)**

(b). The length of an α - particle track in a cloud chamber is 37mm. If the average required to produce an ion pair is 5.2×10^{18} J and on the average an α - particle produces 5.0×10^3 ions pair per mm of its track. Calculate the initial energy of the α - particle. Give your answer in MeV. **(10 marks)**

5. (a). Give mathematical statements of:

(i). Faraday's law of electromagnetic induction. . **(2.5 marks)**

(ii). The relation between current and potential difference. **(2.5 marks)**

(b). If 240 V a.c is applied at the primary coil of a step down transformer, what is the ratio of the secondary turns to primary turns, if the voltage available at the secondary coil is 60V? **(10 marks)**

(Total marks = 15 marks)

