NATIONAL OPEN UNIVERSITY OF NIGERIA

PLOT 91, CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESSWAY, JABI - ABUJA

FACULTY OF SCIENCES

DEPARTMENT OF PURE AND APPLIED SCIENCE

2021_1 EXAMINATIONS 123d

COURSE CODE:	**PHY 303**
COURSE TITLE:	**SPECIAL RELATIVITY**
CREDIT UNIT:	**2**
TIME ALLOWED:	**(2 HRS)**

INSTRUCTION: *Answer question 1 and any other three questions*

QUESTION 1

(a) If the coordinate of a point C is (2m, 4m, 5m, 6s). Give the meaning. (2 marks)

(b) Mention the difference and one similarity between General relativity and Special relativity. (3 marks).

(c) What do you understand by frame of reference? (2 marks).

(d) (i) Write four differences between inertial and non-inertial frames

(ii) Can the earth be considered as inertial frame in relation to the sun? (8 marks)

(e) What is Galilean Theory? (3 marks)

(f) Does time stop at the speed of light? (3 marks)

(g) A particle has momentum with magnitude 1.2×10^5 Kg m/s and energy 4.4×10^{-1} Joules. What is its mass? (4 marks)

QUESTION 2

(a) State the Galilean transformation equation (4 marks)

(b) What is the physical significance of the Galilean transformation equations? (3 marks)

(c) Differentiate between Galilean transformation and Lorentz transformation (5 marks)

(d) (i) Under what condition does Galilean transformation reduce to Lorentz transformation? (1.5marks)

(ii) What is Galilean invariance? (1.5marks)

QUESTION 3

    (a)   Write down four Maxwell's equations in rationalized MKS system of units (5 marks)

    (b)   Show that if there is any force of electrical origin in the S' frame there

           must be a force of magnetic origin in the S frame.   (5 marks)

    (c)   Surface and volume density are not Lorentz invariant. (Discuss)   (5 marks)

QUESTION 4

    (a)   Show that linear charge density is Lorentz variant   5 marks

    (b)   Briefly explain the term space – time as regards to relativity   5 marks

    (c)   What do you understand by force four vectors?   5 marks

QUESTION 5

    (a)   What is momentum four vectors?   (3 marks)

    (b)   State the meaning of any three of the following:

        (i)   Orthogonal transformation

        (ii)   Group

        (iii)   Minkowski space

        (iv)   Euchidean space

        (v)   Poincaré   (7.5 marks)

    (c)   Give three viewpoints that were meant to retain the ether concept.   (4.5marks)