NATIONAL OPEN UNIVERSITY OF NIGERIA
PLOT 91, CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESSWAY, JABI - ABUJA
FACULTY OF SCIENCES

DEPARTMENT OF PHYSICS

2024_1 EXAMINATION

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

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

QUESTION 1

(a) Define the inertia frame of reference? **(4marks)**
(b) Define Einstein's simultaneity **(7marks)**
(c) Write clearly the Einstein's mass energy equation **(5marks)**
(d) Explain the relativistic addition of velocities **(5marks)**
(e) Highlight the features of orthogonal transformation **(4marks)**

QUESTION 2

(a) From the Newton's 2nd law of motion, show that the equation are invariant under Galilean transformation. **(5marks)**
(b) Define the term Galilean transformation invariance **(4marks)**
(c) If a rod travels with a speed $v = 0.6c$ along its length, how much does it shrink?

(6marks)

QUESTION 3

(a) Explain the term length contraction**(5marks)**
(b) Write the time dilation formula and define its terms**(4marks)**
(c) At the time a spaceship moving with speed $v = 0.7c$ passes a space station located near mars, a radio signal is sent from the station to earth. This signal is received on earth $1{,}123s$ later. How long does the signal take to reach the ship as measured by the crew of the spaceship if it arrives at 2500s.**(6marks)**