NATIONAL OPEN UNIVERSITY OF NIGERIA
14/16 AHMADU BELLO WAY, VICTORIA ISLAND, LAGOS
SCHOOL OF SCIENCE AND TECHNOLOGY
JUNE/JULY EXAMINATION

COURSE CODE:CIT412
COURSE TITLE: MODELLING AND SIMULATION
TIME ALLOWED:2 HOURS
INSTRUCTION:Answer any five questions

1. (a) Explain the following terms:
   i. Modelling
   ii. Model
   iii. Simulation
   (b) Enumerate and explain five types of Models available, outlining at least five procedures involved in modelling.

2. (a) Explain how a computer generates a sequence of random numbers, outlining other ways of
Generating pseudo-random numbers.
   (b) Write a QBASIC program to simulate the tossing of a fair coin 10 times. The program displays a H
when a Head appears and a T when a Tail appears.

3. (a) Briefly explain theCongruential Methods. Using the Congruential method, generateat least eight
sets of random numbers, where m = 8, a = 5, c = 7 and the Seed X_o = 4.
   (b) Enumerate and discuss explicitly the various methods of generating random numbers; indicating the
formulas applicable under each methods.

4. (a) Explain the Monte Carlo's Algorithm, outlining the steps involved in deriving an algorithm.
   (b) Enumerate and discuss the areas of application of the Monte' Carlo Method.

5.(a) Briefly explain when a probability is:
   i. Jointly
   ii. Mutually Exclusive
   iii. Conditional
   (b) Develop a function procedure called RAND in QBASIC which generates a random number between 0 and 1 using mixed congruential method. Assume a 16-bit computer.

6. (a) Explain the term Simulation. Enumerate its objectives and its various types, clearly explaining at
least two of its types.

(b) Using suitable diagram, explain the various steps involved in the physical simulation process.