

**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:

1. Modelling
2. Model
3. 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 Xo = 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:

1. Jointly
2. Mutually Exclusive
3. 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.