ELIZADE UNIVERSITY, ILARA-MOKIN, ONDO STATE

FACULTY: BASIC AND APPLIED SCIENCES
DEPARTMENT: MATHEMATICS AND COMPUTER SCIENCE
2nd SEMESTER EXAMINATIONS
2016 / 2017 ACADEMIC SESSION

COURSE CODE: CSC 426

COURSE TITLE: Computer Simulation and Modelling

DURATION: 2 Hours

**COURSE LEADER:** Dr. E. Ayetiran

HOD's SIGNATURE

INSTRUCTION:

You should answer any **THREE** Questions. There are **60 marks** in total for the examination paper.

Students are warned that possession of any unauthorized materials in an examination is a serious offence.

1. With the aid of appropriate mathematical formalism, state the following operational laws in modelling: (a) Forced flow law (b) Little's law (c) Utilization law (d) General residence law (e) Interactive response law **(20 marks)**

2. (a) Explain the two approaches to simulation clock advancement (**(4 marks)**

   (b) State and explain four service disciplines **(4 marks)**

   (c) With the aid of appropriate flowchart, describe the organization and main components of a discrete event simulation model **(12 marks)**

3. (a) Explain four areas of simulation application **(12 marks)**

(b) Consider a single server queuing model below implementing FIFO service discipline over a period of time T in which $G(t)$ denotes the number of customers/processes in the system at time t. T_i is the total time during $[0,...,T]$ in which an i customer/process is in the system:

G(t)

3

T₃

2

T₂   T₂

1

T₁   T₁   T₁   T₁

T₀   T₀

2   4   6   8   10   12   14   16   18   T=20   t
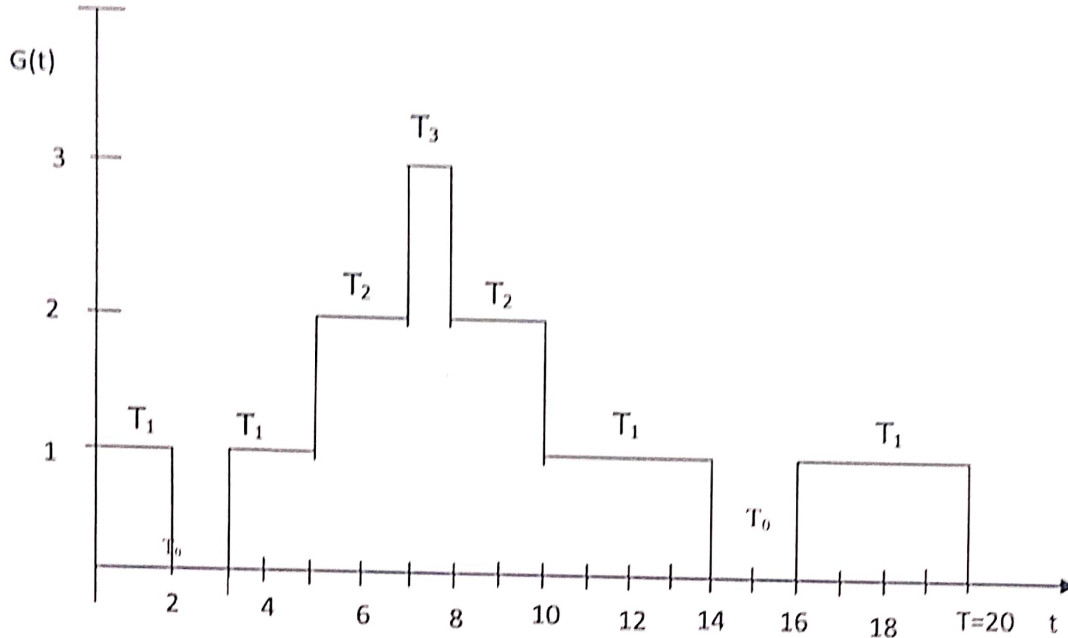
(i). Calculate the average time spent in system per customer/process (in minutes) **(4 marks)**

(iii). Calculate the time-average number in system **(4 marks)**

4. (a) State and explain two major properties of a random number **(8 marks)**

(b) Use the linear congruential method to generate a sequence of random numbers with $x_o = 57$, $a = 13$, $c = 79$, and $m = 300$. Terminate the generation after five iterations **(6 marks)**

(c) Modify (b) above to generate random numbers between 0 and 1. Terminate the generation after five iterations **(6 marks)**

5. (a) Briefly explain three categorization of programming language that may be used for simulation **(6 marks)**

(b) Differentiate between static and dynamic simulation models **(5 marks)**

(c) What is a system? **(4 marks)**

(d) Differentiate between discrete and continuous systems **(5 marks)**