Riara University

UNIVERSITY EXAMINATIONS

EXAMINATION FOR SEP/DEC 2019 FOR BACHELOR OF SCIENCE IN COMPUTER SCIENCE

COURSE CODE: **RCS 304:** COURSE UNIT**: COMPUTER SIMULATION AND MODELLING**

DATE _____   TIME: 2 HOURS

GENERAL INSTRUCTIONS:

Students are NOT permitted to write on the examination paper during examination time.

This is a closed book examination. Text book/Reference books/notes are not permitted.

SPECIAL INSTRUCTIONS:

This examination paper consists Questions in Section A followed by section B.

Answer **Question 1 and any Other Two** questions.

QUESTIONS in ALL Sections should be answered in answer booklet(s).

1. **PLEASE start the answer to EACH question on a NEW PAGE.**
2. **Keep your phone(s) switched off at the front of the examination room.**
3. **Keep ALL bags and caps at the front of the examination room and DO NOT refer to ANY unauthorized material before or during the course of the examination.**
4. **ALWAYS show your working.**
5. **Marks indicated in parenthesis i.e. ( ) will be awarded for clear and logical answers.**
6. **Write your REGISTRATION No. clearly on the answer booklet(s).**
7. **For the Questions, write the number of the question on the answer booklet(s) in the order you answered them.**
8. **DO NOT use your PHONE as a CALCULATOR.**
9. **YOU are ONLY ALLOWED to leave the exam room 30minutes to the end of the Exam.**
10. **DO NOT write on the QUESTION PAPER. Use the back of your BOOKLET for any calculations or rough work.**

QUESTION ONE 30 MARKS (COMPULSORY)

a) Describe the concept of Simulation and Modelling   **(3 Marks)**

b) Explain the difference between Deterministic or Stochastic Simulation Models **(4 Mark)**

c) List four advantages for using simulation other than experimenting with real life
   Systems?   **(4 Mark)**

d) Explain the two types of random numbers and the desired properties of a good random
   numbers generator   **(6Marks)**

e) You have been tasked to simulate a PIR Motion Sensor using Tinkercad 3D CAD design
   tool, explore the sample circuit below and write a sample program.
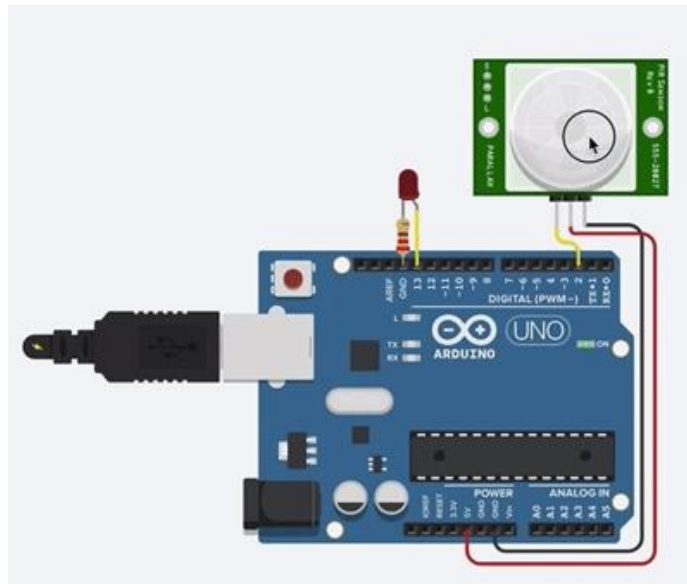
f) Create a variable to store the current state of the sensor   **(2 Marks)**
g) Write the void setup code for the two pin modes   **(4 Marks)**
h) Write the code that will check if sensor pin is HIGH. if it is, set the LED on **(7 Marks)**

ANSWER ANY TWO QUESTIONS

Question Two (20 Marks)

a) Explain the steps that are followed in simulation and modelling **(8 Marks)**

b) Judy is a manager of a mobile factory company. Her factory has been quite successful the past three years. She is wondering whether or not it is a good idea to expand her factory this year. The cost to expand her factory is $1.5M. If she does nothing and the economy stays good and people continue to buy lots of gadgets she expects $3M in revenue; while only $1M if the economy is bad. If she expands the factory, she expects to receive $6M if economy is good and $2M if economy is bad. She also assumes that there is a 40% chance of a good economy and a 60% chance of a bad economy.

Draw a Decision Tree showing these choices showing if Ann should expand the factory or not **(12 Marks)**

Question Three (20 Marks)

a) What are the general characteristics of forecasts modelling **(5 Marks)**

b) What are the advantages of using Linear Congruential Generator(LCG) in generation of random numbers **(3 Marks)**

c) Explain atleast three application areas of simulation and modelling **(6 Marks)**

d) Assume we have 3 processes that we need to run in the order they arrive (FIFO). The first process (P1) takes 5 seconds to finish, the second process (P2) takes 15 seconds and the third process (P3) takes 10 seconds. Calculate throughput and the average waiting time **(6 Marks)**

Question Four (20 Marks)

a) Explain the advantages of using Linear Congruential Generator(LCG) in generation of random numbers **(5 Marks)**

b) Briefly discuss application of simulations and Modelling in business and logistics process simulation **(5 Marks)**

c) Explain areas of performance evaluation in simulation and modelling **(5 Marks)**

d) Describe the factors to consider when evaluating and selecting simulation software

Question Five

a) Explain how an activity duration may be specified (**4 marks)**

b) Briefly explain any three common techniques used to generate random numbers

(4 marks)

c) There are ten people in an office of which any one of them can talk on his/her phones any Minute with a probability of 0.25. Write statements to simulate this situation and identify the number of people who will be on phone between 9.00 am to 9.30 am **(6 marks)**

d) Explain three factors that affects the selection method for forecasting **(6 Marks)**