"Investing in Africa's Future"

COLLEGE OD BUSINESS, PEACE, LEADERSHIP AND GOVERNANCE

MMS409: OPERATIONS RESEARCH

END OF SECOND SEMESTER EXAMINATION

MAY 2021

PROF S. MURAIRWA

TIME: 7 HOURS

INSTRUCTIONS

Answer **ONE** question.

The marks allocated to **each** question are shown at the end of the question.

Credit will be given for logical, systematic and neat presentations.

1. Attempt the following questions:
   a) Develop a simple simulation model. Explain the four variables of your simulation model.
   [30 marks]
   b) Explain the innovation decision making process. With an example, discuss the innovation decision making techniques. **[50 marks]**
   c) Explain the methodology of Operations Research. **[20 marks]**

2. Given the following model:
$$\text{Minimise } Z = 3x + 2y$$
$$\text{Subject to:}$$
$$3x + y \geq 3$$
$$4x + 3y \geq 6$$
$$x + y \leq 3$$
$$x, y \geq 0$$
   a) Identify the model and justify your answer. **[10 marks]**
   b) Explain how you can use the Dual Simplex method to find the optimum tableau. What is the purpose of the optimum tableau? **[25 marks]**
   c) Explain the useful aspects of duality. **[25 marks]**
   d) Discuss the purpose of Operations Research in developing the economy. **[40 marks]**

3. The activities for producing a new product are shown in the following table:

Activity	Preceding	Time in days
A	-	9
B	-	11
C	A	7
D	A	10
E	B, C	1
F	B, C	5
G	D, E	6
H	D, E	3
I	H	1
J	F, G	2
K	G, I	8

   (a) Explain the description of each activity. **[25 marks]**
   (b) What are the earliest start (ES) and latest start (LS) times and slacks? What is the duration of the project? Briefly discuss the slack results you obtained. **[25 marks]**
   (c) Explain why Operations research is important in production and operations management.
   [25 marks]
   (d) With an example, discuss the project planning techniques. **[25 marks]**

END OF PAPER