KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS

2021/2022 ACADEMIC YEAR
SECOND YEAR SECOND SEMESTER

SPECIAL/SUPPLEMENTARY EXAMINATION

FOR THE DEGREE OF BACHELOR OF COMMERCE/FOR THE DEGREE OF BACHELOR OF BUSINESS MANAGEMENT

COURSE CODE: BCO 222/BBM 222

COURSE TITLE: MANAGEMENT DECISION MODELS

DATE: 22/07/2022 TIME: 11.00AM – 1.00PM

INSTRUCTION TO CANDIDATES

1) The paper contains **FIVE** questions
2) Attempt **THREE** questions
3) Question **ONE** is Compulsory
4) Show your work clearly.

KIBU observes **ZERO** tolerance to examination cheating

QUESTION ONE

a) Management Decision Models are applied by Managers to help them make sound decisions in their organiztions. Briefly explain how (5 marks)

b) An electric appliances company produces two products, Refrigerators and Ranges. Production takes place in two separate departments I and II Refregirators are produced in department I and Ranges in Department II. The company's two products are sold on a weekly basis. The weekly production cannot exceed 25 Refrigerators and 35 Ranges .

The company regularly employs a total pf 60 workers in the two departments. A refrigerator 2 man-weeks labour while the Range requires 1 man-week labour. A Refrigerator contributes a profit of kshs 60 and a Range contributes a profit of kshs 40

Formulate the above as a linear programming problem (5 marks)

c) Differentiate between making decisions under risk and uncertainty (3 marks)

d) In Management Decision Models we usually have assumptions that must apply for these models to work. Highlight the assuptions used with ASSIGNMENT PROBLEM MODELS. (5 marks)

e) Describe the steps followed in simulation.state and briefly explain five functional areas the concept of Markov analysis can be applied (5 marks).

f) What do you understand by the term Management Decision Models and what is its distinction with the term Operations Research (5 marks)

QUESTION TWO

A certain commodity is produced by three factories: F_1, F_2 and F_3. The production capacities of the factories are 250, 300 and 400 units respectively. The product is supplied to four factories; S_1 S_2 S_3 and S_4; the requirements of which are 200, 225, 275 and 250 units respectively.

Unit costs of transportation in shillings, are given below

	Destination			
Factory	S_1	S_2	S_3	S_4
F_1	11	13	17	14
F_2	16	18	14	10
F_3	21	24	13	10

Required

Using Vogels Approximation Method (VAM), determine the initial basic solituin.

(20 marks)

QUESTION THREE

A sample of 100 arrivals of students at a workshop is according to the following distribution:

TIME BETWEEN ARRIVALS (MINUTES)	FREQUENCY
0.5	2
1.0	6
1.5	10
2.0	25
2.5	20
3.0	14
3.5	10
4.0	7
4.5	4
5.0	2

A study of the time a technician requires to serve students yields the following distribution

TIME BETWEEN SERVICE (MINUTES	FREQUENCY
0.5	12
1.0	21
1.5	36
2.0	19
2.5	7
3.0	5

Required

a) Using the following random numbers, simulate the next 10 arrivals

ARRIVAL TIME RANDOM NUMBERS: 93, 22, 53, 64, 39, 07, 10, 63, 76, 35
SERVICE TIME RANDOM NUMBERS: 78, 76, 58, 54, 74, 92, 38, 70, 96, 92

b) Estimate

i) Average waiting time of students
ii) Average iddle time of technicians

(20 marks)

QUESTION FOUR

a) Saricom Ltd is planning a project to install fibre optic wires within Kibabii and its environs in order to boost internet connectivity. The project planners have come up with the following schedule.

ACTIVITY	IMMEDIATE PREDECESSOR	TIME ESTIMATE IN WEEKS
A	-	12
B	-	4
C	-	20
D	-	20
E	D	8
F	E	8
G	A,F	8
H	G	8
I	B,H	12
J	B,H	4
K	I,J	6
L	G	9
M	C,I	2
N	K,L	7

Required.

i) Draw the network diagram. (10 marks)

ii) Determine the Critical activities, Critical path and the Project duration (3 marks)

iii) In this kind of a typical project what are the inherent characteristics (7 marks)

QUESTION FIVE

Cars arrive at some service facility (garage) at a rate of 5 cars per hour. The service rate is 8 cars per hour. Calculate the following; (20 marks)

I. Probability of the server being busy (3 marks)
II. Probability that a car arriving will receive service immediately (3 marks)
III. Number of cars expected to be in the system (3 marks)
IV. Number of cars expected in the queue (3 marks)
V. The waiting time of a car in the line (3 marks)
VI. The waiting time of a car in the system (2 marks).
VII. What is the importance of Queuing models to managers

Queuing Characteristics.

1. Average Utilization Rate /probability that a service channel is busy/ traffic intensity.
   (Rho) $\rho = \lambda / \mu$
2. Expected no. of customers in the queuing system.
   $L_s = \lambda/(\mu - \lambda)$
3. Expected no. of customers in the queue.
   $L_q = \lambda^2/(\mu(\mu - \lambda))$
4. Expected time a customer spends in the queuing system.
   $W_s = 1/(\mu - \lambda)$
5. Expected time a customer spends in the queue.
   $W_q = \lambda/(\mu(\mu - \lambda))$
6. The probability of an empty or idle queuing system.
   $\rho_0 = 1 - (\lambda/\mu)$
7. The probability that there are 'n' customers in the queuing system.
   $\rho_n = 1 - (\lambda/\mu)^n (1 - \lambda/\mu)$
8. The probability of the queuing length being greater than or being equal to 'n'.
   $\rho(\geq n) = (\lambda/\mu)^n$