KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS

SPECIAL/SUPPLEMENTARY EXAMINATIONS

2020/2021 ACADEMIC YEAR

SECOND YEAR FIRST SEMESTER

FOR THE DEGREE OF BACHELOR OF COMMERCE

COURSE CODE: BCO 222

COURSE TITLE: MANAGEMENT DECISION MODELS

DATE: 05/08/2021 TIME: 2.00PM-4.00PM

INSTRUCTIONS TO CANDIDATES

1) Answer Question **ONE**(Compulsory) and **ANY OTHER TWO** Questions
2) Candidates must hand in their answer booklets to the invigilator while in the examination room
3) Credit is given for legibility, clarity and use of relevant examples
4) Question **ONE** is **30 marks** while Questions **2-5** carry **20 marks** each
5) Clearly write your **Registration Number** on each answer sheet used

TIME: 2 Hours

KIBU observes **ZERO** tolerance to examination cheating

QUESTION ONE (30mks)

a) Wheat is harvested in Narok plains (Kenya) and stored in grain elevators in three different towns-Oldapashi, Kilgoris and Oltepesi. These grain elevators supply three Unga ltd flour mills, located in Nakuru, Eldoret, and Nairobi. Grain is shipped to the mills via railroad cars, each of which is capable of holding one ton of wheat. Each grain elevator is able to supply the following number of tons (i.e., railroad cars) of wheat to the mills on a monthly basis:

GRAIN ELEVATOR	SUPPLY
Oldapashi	170
Kilgoris	175
Oltepesi	275

Each mill demands the following number of tons of wheat per month;

MILL	DEMAND
Nakuru	200
Eldoret	100
Nairobi	300

The cost of transporting one ton of wheat from each grain elevator (source) to each mill (destination) differs according to the distance and rail system. These costs are shown in the following table;

	MILL		
GRAIN ELEVATOR	**Nakuru**	**Eldoret**	**Nairobi**
Oldapashi	6	8	10
Kilgoris	7	11	11
Oltepesi	4	5	12

Required;

Using the North West corner Method determine the minimum cost of transporting wheat from the elevators to the three mills. (10 marks)

b) Explain the meaning of the following;

i) Balance and unbalanced transportation problem. (5 marks)

ii) Float of a network problem (5 marks)

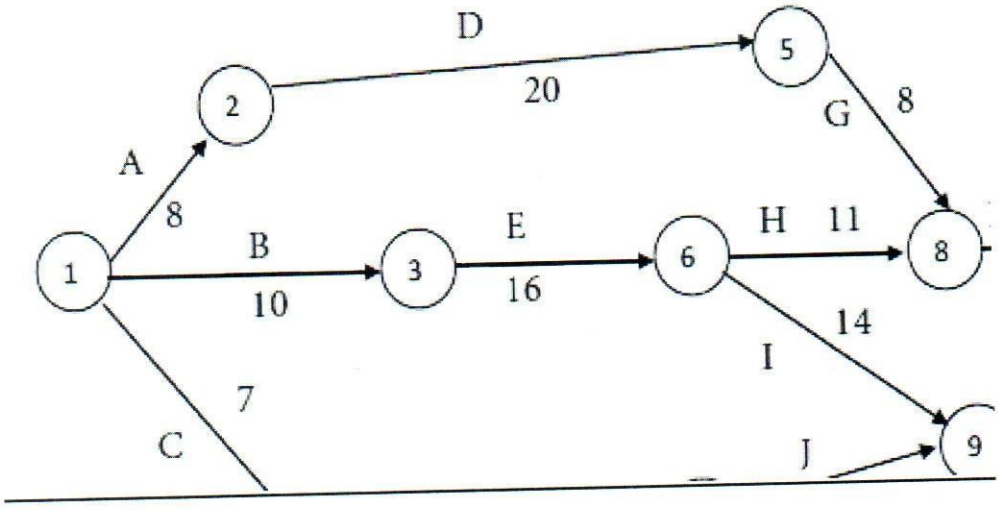
c) A retailer will build a **small** or a **large** facility at a new location. Demand can be either small or large, with probabilities estimated to be 0.4 and 0.6, respectively. For a small facility and high demand, not expanding will have a payoff of KES 223,000 and a payoff of KES 270,000 with expansion. For a small facility and low demand, the payoff is KES 200,000. For a large facility and low demand, doing nothing has a payoff of KES 40,000.The response to advertising may be either modest or sizable, with their probabilities estimated to be 0.3 and 0.7, respectively. For a modest response the payoff is KES 20,000 and KES 220,000 if the response is sizable. For a large facility and high demand, the payoff is KES 800,000

Required:

i. Decision of the above problem (5 marks)
ii. The alternative with the best pay-off. (5 marks)

QUESTION TWO (20marks)

a) Find out the completion time and the critical activities for the following project: (10 marks)



b). Show FIVE factors that determine the features of a queuing system.

(10 marks)

QUESTION THREE (20marks)

a) Explain the following systems of Ques;Single server Ques and Multiple Server Ques (10 marks).

b) Cars arrive at a small gas station to refuel according to a Poisson process with rate 30 per hour, and have an exponential service time distribution with mean 4 minutes. Since there are four gas pumps available, four cars can refuel simultaneously, but unfortunately there is no room for cars to wait. Hence, if a car arrives when all pumps are busy, the driver leaves immediately. For each customer that is served, an average profit is made of KES 700.

(i) Determine the probability that an arriving car is not refueled. (ii) What is the long-run expected profit per day (consisting of eight hours)? (10 marks).

QUESTION FOUR (20marks)

a) Construct a network for each of the activities and their precedence relationships are given below:

Activities	A	B	C	D	E	F	G	H	I	J	K
Predecessor	-	-	A	A	I,J,K	B,D	B,D	F	A	G.H	F

(10 marks)

b) Suppose a queueing system has two servers, exponential inter-arrival times with mean of 1 hour, and exponential service times with mean of 1 hour per customer. Suppose a customer has just arrived at12.00 noon.1. What is the probability that the next arrival will come before1.00 pm (between 1.00 pm and 2.00 pm, after 2.00 pm). (10 marks)

QUESTION FIVE (20marks);

a) In analysing switching by Business Class customers between airlines the following data has been obtained by British Airways (BA):

		Next flight by BA	Competition
Last flight by	BA	0.85	0.15
	Competition	0.10	0.90

or

example if the last flight by a Business Class customer was by BA the probability that their next flight is by BA is 0.85. Business Class customers

make 2 flights a year on average. Currently BA have 30% of the Business Class market.

Required:

What would you forecast BA's share of the Business Class market to be after two years? (10marks)

b) Outline the assumptions of Markovian Models (10 marks)