



TECHNICAL UNIVERSITY OF MOMBASA

INSTITUTE OF COMPUTING AND INFORMATICS
DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

UNIVERSITY EXAMINATION FOR:

BSC IT

BIT 2212: BUSINESS SYSTEMS MODELLING

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: SEPTEMBER 2018

TIME: 2HOURS

DATE: Sep 2018

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE** questions. Attempt question ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

Question ONE

- Explain the advantages and limitations of Business system Modeling[10 Marks]
- Briefly discuss Operation Research approach to Problem Solving[6 Marks]
- Discuss the potential Application areas of “Operations Research” [10 Marks]
- Briefly discuss how linear programming could be used to formulate Business problems

[4 marks]

Question TWO

A company stocks an item that is demanded 1000 units per month and the shortages are allowed. If the unit cost is 20 per unit, the cost of making one purchase is 1000, the holding cost for one unit is 40 per year and the cost of one shortage is 150 per year, determine:

- The economic purchase quantity[2 Marks]
- The time between orders[2 Marks]
- The number of orders per year[2 Marks]
- The optimum shortages[4 Marks]
- The maximum inventory [2 Marks]

f) The number of items being held[4 Marks]

g) The optimum annual cost[4 Marks]

Question THREE

a) The following table gives the activities of a construction project and duration

Christine Philips is in charge of planning and coordinating next spring's sales management training program for her company. Christine has listed the following activity information for this project:

Activity	Activity Description	Immediate Predessors	Estimated duration
A	Selection location	-	2 weeks
B	Obtain speakers	-	3 weeks
C	Make speaker travel plans	A,B	2 weeks
D	Prepare and mail brochure	A.B	2 weeks
E	Take reservations	D	3 weeks

Required: construct a network diagram for the above project[5 marks].

b) Christine has done more detailed planning for this project and so now has the following expended activity list.

Activity	Activity Description	Immediate Predessors	Estimated Duration
A	Select location	-	2 WEEKS
B	Obtain keynote speakers	-	1 WEEK
C	Obtain other speakers	B	2 WEEKS
D	Make travel plans keynote speakers	A,B	2 WEEKS

E	Make travel for other speakers	A,C	3 WEEKS
F	Make food arrangements	A	2 WEEKS
G	Negoatiate hotel rates	A	1 WEEK
H	Prepare brochure	A,C,G	1 WEEK
I	Mail brochure	H	1 WEEK
J	Take reservation	I	3 WEEKS
K	Prepare handouts	J,F	4 WEEKS

- i. Draw a network diagram for the above project[5 marks]
 - ii. Find the critical path [5 marks]
- c) In appraising a 300,000 investment project, a firm uses a discount rate of 5%. The equipment will produce a cash inflow of 75,000 per year, over a five year period. At the end of the five years, the firm expects to sell the equipment for 10,000 .what is the NET PRESENT VALUE?

[5 Marks]

Question FOUR

J.M Bakers has to supply only 200 pizzas every day to their outlet situated in city bazaar. The production of pizzas varies due to the availability of raw materials and labor for which the probability distribution of production by observation made is as follows:

Simulation Problem

Production per day	196	197	198	199	200	201	202	203	204
Probability	0.06	0.09	0.10	0.16	0.20	0.21	0.08	0.07	0.03

REQUIRED: Simulate and find the average number of pizzas produced more than the requirement and the average number of shortage of pizzas supplied to the outlet. Selecting 15 random numbers from random numbers table and simulate the production per day

[10 Marks]

- b) Briefly explain the benefits of using simulation model in business systems modeling[6 Marks]
- c) List out the reasons for maintaining inventory? [4 marks]

Question FIVE

- a) A cargo plane has three compartments for storing cargo: front, centre and rear. These compartments have the following limits on both weight and space:

Compartment	Weight capacity (tonnes)	Space capacity (cubic metres)
Front	10	6800
Centre	16	8700
Rear	8	5300

Furthermore, the weight of the cargo in the respective compartments must be the same proportion of that compartment's weight capacity to maintain the balance of the plane.

The following four cargoes are available for shipment on the next flight:

Cargo	Weight (tonnes)	Volume (cubic metres/tonne)	Profit (£/tonne)
C1	18	480	310
C2	15	650	380
C3	23	580	350
C4	12	390	285

Any proportion of these cargoes can be accepted. The objective is to determine *how much* (if any) of each cargo C1, C2, C3 and C4 should be accepted and *how to distribute* each among the compartments so that the total profit for the flight is maximized.

REQUIRED:

- i. Formulate the above problem as a linear program[4 Marks]
 - ii. What assumptions are made in formulating this problem as a linear program?[4 Marks]
 - iii. Briefly describe the advantages of using a software package to solve the above linear program, over a judgmental approach to this problem.[8 Marks]
- a. . Define money value [2 marks]
- b) Define Present worth factor [2 marks]
- c) Define Discount rate[2 marks]