



TECHNICAL UNIVERISTRY OF MOMBASA

# Faculty of Engineering & Technology

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

UNIVERSITY EXAMINATION FOR DEGREE IN:  
BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY  
(BSIT12S)

**BIT 2212: BUSINESS SYSTEM MODELLING**

END OF SEMESTER EXAMINATION  
**SERIES: DECEMBER 2014**  
**TIME: 2 HOURS**

**Instructions to Candidates:**

You should have the following for this examination

- *Answer Booklet*

This paper consists of **FIVE** questions. Attempt question **ONE (Compulsory)** and any other **TWO** questions  
Maximum marks for each part of a question are as shown

This paper consists of **THREE** printed pages

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**Question One (Compulsory)**

- a) Explain how operations research could be used to model business systems solution (10 marks)
- b) Briefly explain the benefits and limitations of modeling business system (10 marks)
- c) Describe the advantages and disadvantages of using simulation to investigate business problems compared with the use of Mathematical formulas (10 marks)

**Question Two**

The university is having its workshop at Thika campus where most of the maintenance job is spare parts is concerned about the stock level of these parts. He feels that the level is too low. Currently the workshop orders these parts at cost of ksh 40 a unit in batches of 200 units. The workshop operates for 250 days in a year and for each day there is a demand for 100 units of these parts. Ordering cost per batch is ksh 25 while the inventory carrying cost is 12/=. Required:

- (i) Calculate the economic order quantity
- (ii) The time between orders
- (iii) The number of orders per year
- (iv) The optimum annual cost **(20 marks)**

**Question Three**

- a) A Mradi Company is in the business of training people to be computer literate. It trains in four areas, programming, computer applications, networking and graphics. Trainees are charged on an hourly basis profit matrix. Days expected profit in kshs:

Computer Areas				
Trainees	Programming	Applicatio n	Networkin g	Graphic s
Kint	1	8	4	1
Talesu	5	7	6	5
Sokaw	3	5	4	2
Simba	4	1	6	3

Required:

Assign the four trainees to the four compute areas so as to maximize the day expected profits.

**(10 marks)**

- b) Consider the project of building a house. The details of the project activities are tabulated below. Draw a network diagram tabulated below. Draw a network diagram **(10 marks)**

Activity	A	B	C	D	E	F	G	H	I	J	K
Immediate Predecessor		A		B,C	C	G,H	B	F	G	E, I, J	

**Question Four**

- a) A wholesale company has three warehouses from which supplies are drawn to four retails. The company deals in a single product, the supplies at each warehouse are:

Warehouse	Supply (Tonnes)
1	20
2	28
3	17

Customer	Demand (Tonnes)
1	15
2	19
3	13
4	18

The following table gives the transportation costs per ton shipment from each warehouse to each customer

WAREHOUSE	1	2	3	4
1	Ksh 210	Ksh 420	Ksh 50	Ksh 350
2	420	70	140	350
3	490	560	270	630

Required:

Using the Northwest corner rule and the least cost method, determine what supplies to dispatch from each of the warehouses to each customer so as to minimize overall transportation cost

**(20 marks)**

### Question Five

- a) In appraising a 300,000 investment projects, a firm uses a discount rate of 5%. The equipment will produce a cash inflow of 75,000 per year, over a 5 year period. At the end of the 5 years, the firm expects to sell the equipment for 10,000. What is the NPV? **(8 marks)**
- b) The following data are annual (on minutes counting from 0) and services times (in minutes) for the first six customers awaiting a dental clinic with one dentist on duty upon annual a customer enters service in the dentist is free or joins the waiting line when the dentist has finished work on a customer, the next one in line enters service:

Annual Time	12	31	63	95	99	154
Service Time	40	32	55	48	18	50
Probability	0.2	0.1	0.3	0.1	0.1	0.2

Required:

- (i) Assuming a single server develop a simulation table. **(5 marks)**
- (ii) Calculate the average waiting time for each customer **(3 marks)**
- (iii) Determine the idle time the dentist has **(2 marks)**

Random numbers for inter arrival time  
20, 7, 13, 59, 71, 69, 25, 31, 9, 17

Random numbers for service time  
17, 29, 31, 69, 97, 53, 44, 71, 9, 3