



TECHNICAL UNIVERISTY OF MOMBASA

# Faculty of Engineering & Technology

UNIVERSITY EXAMINATION FOR:  
BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY  
(BSIT 12J – Y3 S1)

**BIT 2212: BUSINESS SYSTEMS MODELLING**

END OF SEMESTER EXAMINATION

**SERIES: APRIL 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 the advantages and limitations of Business System Modeling. **(10 marks)**
- b) Briefly discuss Operation Research approach to problem solving. **(6 marks)**
- c) Discuss the potential application areas of “Operation Research” **(10 marks)**

- d) Briefly discuss how linear programming could be used to formulate business problem. **(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 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:

- (i) The economic purchase quantity
- (ii) The time between order
- (iii) The number of orders per year
- (iv) The optimum shortages
- (v) The maximum inventory
- (vi) The time of items being held
- (vii) The optimum annual cost **(20 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 the company. Christine has listed the following activity information for this project.

Activity	Activity Description	Immediate Predecessors	Estimated Duration
A	Selection Location	-	2 weeks
B	Obtain Speaker	-	3 weeks
C	Make speaker travel plan	A, B	2 weeks
D	Prepare and email brochure	A, B	2 weeks
E	Take Reservation	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 Predecessor	Estimated Duration
A	Select Location	-	2 weeks
B	Obtain Keynote speaks	-	1 weeks
C	Obtain other speakers	B	2 weeks
D	Make Travel Plans	A, B	2 weeks
E	Make travel plans for other speaker	A, C	3 weeks
F	Make food a management	A	2 weeks
G	Negotiate 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 the network diagram for the project
- (ii) Find the critical path

(15 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 5 year period. At the end of 5 years the firm expects to sell the equipment for 10,000. What is the NET PRESENT VALUE? (5 marks)

**Question Four**

- a) The manager of company A is considering the proposal to take over company B, based on the following observation. Company A estimates the probability distribution of costs and revenues of the takeover proposal as under:

Cost Per Day	Probability	Revenue Per Day	Probability
18,000	0.15	20,000	0.15
20,000	0.20	25,000	0.15
35,000	0.25	45,000	0.40
45,000	0.40	70,000	0.30

Using the following random number, simulate the cost and revenue for 10 runs to obtain the probability distribution of net revenue to company A, if it takes over company B. Random number for cost:

40, 12, 82, 65, 74, 92, 47, 60, 61, 62

Random number for revenue:

12, 98, 31, 86, 87, 38, 88, 19, 09, 44

**Question Five**

The cost of transportation from a plant to the distribution centre has been displayed in the following table:

Plant	1	2	3	4	5	Supply
1	20	25	27	20	15	40
2	18	21	22	24	20	70
3	19	17	20	18	19	90
4	0	0	0	0	0	30
<b>Demand</b>	30	40	60	40	60	230

**Required:**

- a) Formulate the above transport problem as an LP problem
- b) Use Northwest corner rule to find the optimal solution
- c) Use least cost method to solve the problem

(20 marks)