UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF INDUSTRIAL TECHNOLOGY

FINAL EXAMINATION

JANUARY 2016 SEMESTER

COURSE CODE	:	JLB 40403
COURSE TITLE	:	QUANTITATIVE ANALYSIS
PROGRAMME LEVEL	:	BACHELOR
DATE	:	22 MAY 2016
TIME	:	2.30 PM - 5.30 PM
DURATION	:	3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. This question paper consists of TWO (2) sections.
4. Answer ALL questions in Section A. Choose THREE (3) questions in section B.
5. Please write your answers on the answer booklet provided.
6. Table and formula are enclosed as reference.
7. Please answer all questions in English only.

THERE ARE 6 PAGES OF QUESTIONS EXCLUDING THIS PAGE.

SECTION A (Total: 40 marks)

INSTRUCTION: Answer ALL questions.
Please use the answer booklet provided.

Question 1

Bumi Development is considering several alternatives development projects. The success of the project depends on market condition. The project and their five-year financial returns (in RM millions) given the market conditions are shown in Table 1.

Table 1: Conditional Payoff of Bumi Development

Project	Market		
	Good	Average	Poor
Apartment	33	19	12
Shops	50	36	22
Office	33	14	2

Determine the best investment using the following decision criteria:

(a) Maximax

(2 marks)

(b) Maximin

(2 marks)

(c) Equally likely criterion

(2 marks)

(d) Criterion of realism using k = 0.7

(2 marks)

(e) Minimax regret criterion

(2 marks)

Question 2

Simulation models are widely used to represent real world situations that enable to explain the dynamic relationships of a certain system in an organization. Simulation is also accepted among managers because of its advantages. Explain **FIVE (5)** advantages of simulation to an organization.

(10 marks)

Question 3

In a department, there are three tasks to be assigned to three workers. Table 2 indicates the daily profit (in RM hundreds) achieved by assigning each worker to each task.

Table 2: Daily Profit of Workers and Tasks

Job / Worker	I	II	III
Malik	70	90	85
John	75	60	55
Harry	65	85	60

(a) Identify the assignments that will maximize profit.

(8 marks)

(b) Calculate the total daily profits.

(2 marks)

Question 4

Queuing can be one of the most unpleasant experiences in our life. We queue to pay bills, to buy food, at bank, at supermarket, etc. Thus queue can affect people satisfaction as they have to wait in order to fulfill their need. Due to that, organizations are looking for the solution and queuing theory is one of the available alternatives. Queuing theory deals with problems which involve queuing or waiting. Discuss **THREE (3)** queuing system parts that famously discussed in queuing theory.Provide suitable examples to support your explanation on the queuing system. (10 marks)

SECTION B (Total: 60 marks)

INSTRUCTION: Answer THREE (3) questions ONLY.
Please use the answer booklet provided.

Question 1

(a) Bright company manufactures two types of food containers model M and W. The production of a model M requires 2 units of raw materials and 3 hours of labour. The production of model W requires 3 units of materials and 2 hours of labour. The firm has 100 units of materials and 50 hours of labour available for the production of the two models per week. Demand for the containers W is at least 20. A model M container contributes a profit of RM 10 while model W contributes RM 15.

i. Formulate the problem using linear programming model

(3 marks)

ii. Identify number of each type of containers should the firm produce to maximize profit

(5 marks)

iii. Calculate the maximum profit

(2 marks)

(b) Given the following incomplete simplex tableau in Table 3.

Table 3: Incomplete Simplex Tableau

C_j	Solution mix	6	10	20	0	0	Quantity
		X_1	X_2	X_3	S_1	S_2	
	S_1	3	-1	0	1	-0.5	58
	X_3	0.5	2.5	1	0	0.25	15
	Z_j						
	$C_j - Z_j$						

i. Complete the above simplex tableau.

(3 marks)

ii. Write the solution and profit from the figures in the tableau.

(2 marks)

iii. Determine whether the solution obtained is optimal or not. Explain your answer.

(3 marks)

iv. Determine the shadow price of resource 1 and resource 2.

(2 marks)

Question 2

The output from source A and B are 350 and 400 units respectively. The demand from customers L, M, N and O are 200, 180, 150 and 170 units respectively. The units cost for transporting from various sources to the destination are given in the following Table 4.

Table 4: Estimated Transportation Cost

Source	Destination			
	L	M	N	O
A	4	10	6	14
B	8	16	6	12

(a) Find an initial solution using Northwest corner rule

(5 marks)

(b) Determine the optimal solution and the minimum transportation cost

(10 marks)

(c) Determine whether there is an alternative for optimal solution or not. If so, find the solution. Show that the cost remains the same.

(5 marks)

Question 3

Mentari Enterprise sells children learning kit and the annual demand for the kit is 6200 units. The company's policy is to order 200 units of learning kit each time an order is placed and the lead time for an order is 3 days. The learning kit costs RM 300 each. The annual holding cost for the inventory is 4% of the cost and the ordering cost is RM 15 per order. Mentari Enterprise is opened for business 250 days a year.

(a) Calculate the total cost associate with the current policy

(2 marks)

(b) If EOQ model is used

i. Calculate the optimal order policy.

(3 marks)

ii. Calculate the numbers of order(s) per year.

(3 marks)

iii. Calculate the annual ordering cost.

(3 marks)

iv. Calculate the cycle time.

(3 marks)

v. Calculate the annual total inventory cost.

(3 marks)

vi. Determine the reorder point.

(3 marks)

Question 4

Belle Cosmetic is planning to produce a new cosmetic. The project manager has listed the activities that must be accomplished with the following Table 5.

Table 5: Activities and Immediate Predecessors

Activity	Immediate Predecessors	Normal Time (weeks)	Crash Time (weeks)	Normal Cost (RM)	Crash Cost (RM)
A	-	4	3	90	150
B	-	3	2	200	270
C	-	6	4	100	180
D	A	6	3	120	132
E	D	5	3	80	140
F	B, E	3	1	300	420
G	B, C	3	2	100	180

(a) Draw the network for the project.

(7 marks)

(b) Determine the critical path and the project completion time.

(3 marks)

(c) Crash the project to 13 weeks.

(7 marks)

(d) Calculate the project cost to meet the 13 weeks completion time.

(3 marks)

END OF EXAMINATION PAPER

Formula

1. Ordering cost per order = C_0
2. Number of orders = D/Q
3. Average inventory level = Q/2
4. Annual ordering cost = (D/Q) C_0
5. Annual holding cost = (Q/2) C_h
6. TC = (D/Q) C_0 +(Q/2) C_h
7. EOQ = Q = $\sqrt{2DC_0 / C_h}$
8. ROP = d x L