Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2014/2015

COURSE NAME	:	TRANSPORTATION
COURSE CODE	:	BWA 31103
PROGRAMME	:	3 BWA
EXAMINATION DATE	:	JUNE 2015/JULY 2015
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

THIS QUESTION PAPER CONSISTS OF **SIX(6)** PAGES

Q1 (a) Consider a transportation problem in which the cost, supply and demand values are presented in **Table Q1(a)**.

Table Q1(a): Supply and Demand

		Destination				
		1	2	3	4	Supply
Source	1	10	30	25	15	14
	2	20	15	20	10	10
	3	10	30	20	20	15
	4	30	40	35	45	13
Demand		10	15	12	15	

(i) Is this a balanced problem? Why?

(5 marks)

(ii) Obtain the initial feasible solution using the North-West Corner rule.

(10 marks)

(b) What do you mean by degeneracy in a transportation problem? Explain how degeneracy in a transportation problem may be resolved?

(5 marks)

(c) How do you convert the unbalanced transportation problem into a balanced one? State the necessary and sufficient condition for the existence of a feasible solution to a transportation problem.

(5 marks)

Q2 (a) Define the optimal solution for the transportation problem. When does a transportation problem have a unique solution?

(5 marks)

(b) Two drug companies have inventories of 1.100 million doses of a particular flu vaccine, and an epidemic of the flu seems imminent in three cities. Since the flu could be fatal to senior citizens, it is imperative that they be vaccinated first; others will be vaccinated on a first-come-first-served basis while the vaccine supply lasts. The amounts of vaccine (in millions of doses) each city estimates it could administer are as follows in **Table Q2(b)(i)**:

Table Q2(b)(i): Amount of vaccine

	City 1	City 2	City 3
To Elders	0.325	0.260	0.195
To Others	0.750	0.800	0.650

The shipping costs (in cents per dose) between drug companies and cities are as follows in **Table Q2(b)(ii)**:

Table Q2(b)(ii): Transportation Cost

	City 1	City 2	City 3
Company 1	3	3	6
Company 2	1	4	7

(i) Formulate a transportation problem which will provide each city with at least enough vaccine to care for its senior citizens.

(*Hint: Divide each city into two destinations, senior citizens and others.*)

(7 marks)

(ii) Find the solution using VAM Method.

(5 marks)

(iii) Test for optimality and find the optimal solution.

(8 marks)

Q3 (a) A fast-food chain wants to build four stores in the Kuala Lumpur area. In the past, the chain has used six different construction companies, and having been satisfied with each, has invited each to bid on each job. The final bids (in thousands of RM) were as shown in **Table Q3(a)**.

Table Q3(a): Final Bids

	Construction Companies					
	1	2	3	4	5	6
Store 1	85.3	88.0	87.5	82.4	89.1	86.7
Store 2	78.9	77.4	77.4	76.5	79.3	78.3
Store 3	82.0	81.3	82.4	80.6	83.5	81.7
Store 4	84.3	84.6	86.2	83.3	84.4	85.5

Since the fast-food chain wants to have each of the new stores ready as quickly as possible, it will award at most one job to a construction company. What assignment results in minimum total cost to the fast-food chain?

(10 marks)

(b) A firm employs typists for piecemeal work on an hourly basis. There are five typists available and their charges and speeds are different. According to an earlier understanding, only one job is given to one typist and the typist is paid for full hours even if he works for a fraction of an hour. Find the least cost allocation for the following data in **Table Q3(b)**.

Table Q3(b): Cost Allocations

Typist	Rate/Hour	Pages/Hour	Job	No. of Pages
A	RM 5	12	P	299
B	RM 6	14	Q	175
C	RM 3	8	R	145
D	RM 4	10	S	298
E	RM 4	11	T	178

(15 marks)

Q4 (a) List out the differences between assignment problem and transportation problem?

(5 marks)

(b) Consider the data of **Table Q4(b)**. If a crew based in Kuala Lumpur (KUL) arrives at Singapore (SGP) on a given flight, it must return to Kuala Lumpur on a later flight. Assume that for any given pairing, the crew will be based in the city that results in the smaller layover. The problem is to find the pairings so as to minimize the time on ground away from home, subject to a minimum interval of one hour between arrival and departure. Given the pairs of flights, where should the crews be based?

(10 marks)

Table Q4(b): Schedule of Flights

Flight No.	From	Time of Departure	To	Arrival Time
MH010	KL	6.00 am	SGP	8.00 am
MH020	KL	7.00 am	SGP	9.00 am
MH030	KL	10.00 am	SGP	12.00 noon
MH040	KL	2.00 pm	SGP	4.00 pm
MH050	KL	6.00 pm	SGP	8.00 pm
MH060	KL	8.00 pm	SGP	10.00 pm
MH070	SGP	6.00 am	KL	8.00 am
MH080	SGP	8.00 am	KL	10.00 am
MH090	SGP	11.00 am	KL	1.00 pm
MH100	SGP	3.00 pm	KL	5.00 pm
MH110	SGP	6.00 pm	KL	8.00 pm
MH120	SGP	9.00 pm	KL	11.00 pm

(c) A travelling salesman has to visit 5 cities. He wishes to start from a particular city, visit each city once and return to his starting point. The travelling cost for each city from a particular city is given in **Table Q4(a)**.

Table Q4(a): Supply and Demand

From city \ To city	A	B	C	D	E
A	∞	4	7	3	4
B	4	∞	6	3	4
C	7	6	∞	7	5
D	3	40	35	∞	13
E	4	4	5	7	∞

What is the sequence of visit of the salesman, so that the cost is minimum?

(10 marks)

- END OF QUESTION -