UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
(TAKE HOME)
SEMESTER II
SESSION 2019/2020

COURSE NAME	:	MANAGEMENT SCIENCE I
COURSE CODE	:	BPB 20403
PROGRAMME CODE	:	BPA
EXAMINATION DATE	:	JULY 2020
DURATION	:	24 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS. **OPEN BOOK EXAMINATION**

THIS QUESTION PAPER CONSISTS OF **THREE (3)** PAGES

TERBUKA

Q1   (a)   A burger restaurant franchises in Los Angeles are supplied from a central warehouse in Inglewood. The location of the warehouse and its proximity, in minutes of travel time, to the franchises are given in the network shown in **Figure Q1(a)**.
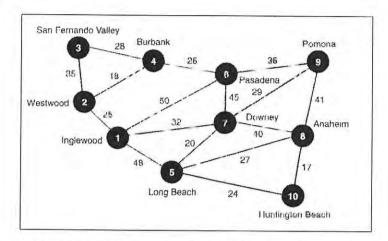

Figure Q1(a): The proximity (in min) of Inglewood warehouse to it franchises.

Propose the shortest route from the warehouse at Inglewood to each of the nine franchises if the truck supply each franchise on a daily basis.

(10 marks)

(b)   The three semiconductor component producer in Kuala Lumpur are coordinated through a central office that facilitates semiconductor component delivery to four company in the region. The cost to ship a standard container of semiconductor component from each producer to each company is shown in the **Table Q1(b)**. Also given are the number of containers available at each producer and the number of containers needed at each company.

Table Q1(b): Producer supplies, company demand and shipping cost (RM)

From	To				Supply
	Company 1	Company 2	Company 3	Company 4	
Producer 1	10	8	11	11	40
Producer 2	11	14	15	9	55
Producer 3	16	11	18	7	45
Demand	50	30	35	25	140

Compute the optimal solution by using the Stepping Stone method.

(15 marks)

Q2   (a)   Back Savers is a company that produces backpacks primarily for students. They are considering offering some combination of two different models the Collegiate and the Mini. Both are made out of the same rip resistant nylon fabric. Back Savers has a long term contract with a supplier of the nylon and receives a 5000 square-foot shipment of the material each week. Each Collegiate requires 3 square feet while each Mini requires 2 square feet. The sales forecasts indicate that at most 1000 Collegiates and 1200 Minis can be sold per week. Each Collegiate requires 45 minutes of labor to produce and generates a unit prot of RM32. Each Mini requires 40 minutes of labor and generates a unit prot of RM24. Back Savers has 35 laborers that each provides 40 hours of labor per week.

Formulate a linear programming model to maximise the profit for this problem

(5 marks)

(b)   A car manufacturer has a production line making two styles of car seats. Style I requires 300 grams of cotton thread, 400 grams of dacron thread, and 400 grams of linen thread. Style II requires 300 grams of cotton thread, 300 grams of dacron thread and 200 grams of linen thread. The manufacturer makes a net profit of RM25 on Style I and RM20 on Style II. He has in hand an inventory of 3.4 kg of cotton thread, 3.6 kg of dacron thread and 3.2 kg of linen thread. His immediate problem is to determine a production schedule, given the current inventory to make a maximum profit.

(i)   Formulate an integer linear programming model.

(5 marks)

(ii)   Illustrate the constraints for this problem with a standard scale in sketching. Use dots to indicate all feasible integer solutions.

(7 marks)

(iii)   Determine the optimal solution to the LP Relaxation, and round down to find a feasible integer solution.

(4 marks)

(iv)   Identify the optimal integer solution for this problem.

(2 marks)

(v)   Compare the solution obtained in **Q2(b)(iii)** by rounding down with **Q2(b)(iv)**.

(2 marks)

-END OF QUESTIONS-

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