



**UTHM**

Universiti Tun Hussein Onn Malaysia

**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
SEMESTER II  
SESSION 2017/2018**

COURSE NAME : MANAGEMENT SCIENCE II  
COURSE CODE : BPB 20603  
PROGRAMME CODE : BPA  
EXAMINATION DATE : JUNE / JULY 2018  
DURATION : 3 HOURS  
INSTRUCTION : ANSWER ALL QUESTIONS

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THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES

**Q1** Southland Corporation’s decision to produce a new line of recreational product resulted in the need to construct either the small plant or a large plant. The best selection of plant size depends on how the market place reacts to the new product line. To conduct an analysis, marketing management has decided to view the possible long-run demand as either low, medium, or high. **Table Q1** shows the projected profit in millions of Ringgit Malaysia:

**Table Q1: Payoff table of Southland Corporation company**

Plant Size	Long-Run Demand		
	Low	Medium	High
Small	150	200	200
Large	50	200	500

- (a) Determine the decision to be made, and the chance event for Southland’s problem. (3 marks)
- (b) Construct an influence diagram. (4 marks)
- (c) Construct a decision tree (4 marks)
- (d) Recommend decision based on the use of;
  - (i) Optimistic approach
  - (ii) Conservative approach
  - (iii) Minimax regret approach (9 marks)

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**Q2** To save on expenses, Haziq and Zikri agreed to form a carpool for traveling to and from work. Haziq preferred to use the somewhat longer but more consistent Straits Quay Avenue. Although Zikri preferred the quicker expressway, he agreed with Haziq that they should take Straits Quay Avenue if the expressway had a traffic jam. **Table Q2** shows the payoff table which provides the one-way time estimate in minutes for traveling to or from work:

**Table Q2: Payoff table in minutes for traveling to or from work**

Decision Alternative	State of Nature	
	Expressway open, $s_1$	Expressway jammed, $s_2$
Straits Quay Avenue, $d_1$	35	35
Expressway, $d_2$	25	55

Based on their experience with traffic problems, Haziq and Zikri agreed on a 0.25 probability that the expressway would be jammed. In addition, they agreed that weather seemed to affect the traffic conditions on the expressway.

Let,

$C$  = clear

$O$  = overcast

$R$  = rain

The following conditional probabilities apply with the weather conditions.

$$\begin{aligned}
 P(C | s_1) &= 0.7 & P(O | s_1) &= 0.2 & P(R | s_1) &= 0.1 \\
 P(C | s_2) &= 0.2 & P(O | s_2) &= 0.3 & P(R | s_2) &= 0.5
 \end{aligned}$$

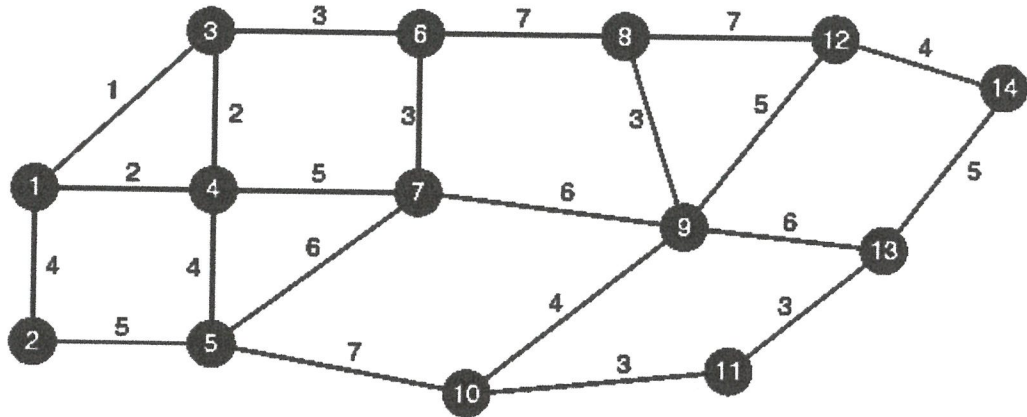
- (a) Compute the conditional probability of the expressway open  $s_1$  or jammed  $s_2$  given each weather condition. (10 marks)
- (b) Determine the optimal decision strategy, and the expected travel time. (10 marks)



**Q3** (a) Define Spanning Tree and Minimal Spanning Tree.

(5 marks)

(b) Bechtold Construction is in the process of installing power lines to a large housing development. Steve Bechtold wants to minimize the total length of wire used, which will minimize his costs. The housing development is shown as a network in **Figure Q3**. Each house has been numbered, and the distances between houses are given in hundreds of metres.



**Figure Q3: Network of housing development and the distances between houses**

Propose a minimal spanning tree network that will connect all the houses and indicate the total minimum length of wire.

(15 marks)

**Q4** Paul Tolsky, owner of Tolsky Works, has recorded the operation of his milling machine for several years. Over the past two years, 80% of the time the milling machine functioned correctly during the current month if it had functioned correctly in the preceding month. In addition, it has been observed that 90% of the time the machine not functioning correctly for any given month if it was not functioning correctly in the preceding month.

(a) Tabulate the matrix of transition probabilities.

(4 marks)

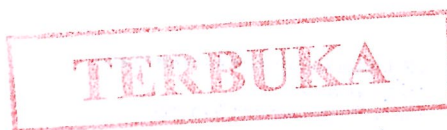
(b) Assume that the milling machine functioned correctly during current month.

Compute the probability that the machine will be functioning correctly in the next two months.

(6 marks)

(c) Compute the steady-state probabilities.

(10 marks)



- Q5** Rob Roller owns and operates Rollers Air Transport Service, which ship cargo by plane to most large cities in the United States and Canada. The remaining capacity for one of the flights from Seattle to Vancouver is ten tons. There are four different items that Rob can ship between Seattle and Vancouver. The number of units of each cargo type, the weight per unit, and the profit per unit are shown in **Table Q5**.

**Table Q5: Number of units of each item type, weight per unit, and profit per unit**

<b>Item Type</b>	<b>Units Available</b>	<b>Weight per Unit (ton)</b>	<b>Profit (RM)</b>
1	2	2	5
2	2	3	8
3	1	4	9
4	6	1	3

Calculate the optimum number of units for each item type and the maximum profit.

(20 marks)

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**-END OF QUESTIONS-**