Universiti Tun Hussein Onn Malaysia

# UNIVERSITI TUN HUSSEIN ONN MALAYSIA

## FINAL EXAMINATION
## SEMESTER II
## SESSION 2015/2016

| | | |
|---|---|---|
| COURSE NAME | : | MANAGEMENT SCIENCE II |
| COURSE CODE | : | BPB 20603 |
| PROGRAMME CODE | : | BPA |
| EXAMINATION DATE | : | JUNE / JULY 2016 |
| DURATION | : | 3 HOURS |
| INSTRUCTION | : | ANSWERS **ALL** QUESTIONS |

THIS QUESTION PAPER CONSISTS OF **FIVE (5)** PAGES

**Q1** 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 Q1** shows the payoff table which provides the one-way time estimate in minutes for traveling to or from work:

**Table Q1**

| | **State of Nature** | |
|---|---|---|
| **Decision Alternative** | Expressway open, $s_1$ | Expressway jammed, $s_2$ |
| Straits Quay Avenue, $d_1$ | 30 | 30 |
| Expressway, $d_2$ | 25 | 45 |

Based on their experience with traffic problems, Haziq and Zikri agreed on a 0.15 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.

$$P(C \mid s_1) = 0.8 \quad P(O \mid s_1) = 0.2 \quad P(R \mid s_1) = 0.0$$
$$P(C \mid s_2) = 0.1 \quad P(O \mid s_2) = 0.3 \quad P(R \mid s_2) = 0.6$$

(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)

**Q2** Amy is interested in leasing a new BMW and has contacted three automobile dealers for pricing information. Each dealer offered Amy a closed-end 36-month lease without down payment. It also includes a monthly charge and a mileage allowance. The leasing will also incurred a surcharge for additional kilometers. **Table Q2** shows monthly lease cost, mileage allowance and cost for additional kilometers.

**Table Q2**

| Dealer | Monthly Cost (RM) | Mileage Allowance (km) | Cost per Additinal Kilometers (RM) |
|---|---|---|---|
| Batcha BMW | 299 | 36,000 | 0.15 |
| Muthu Motors | 310 | 45,000 | 0.20 |
| Annamalai Automotive | 325 | 54,000 | 0.15 |

Amy decided to choose the lease option that will minimize her total 36-month lease cost. The difficulty that Amy faced is not sure how many kilometers she will drive over the next three years. For the purpose of this decision, she believes it is reasonable to assume that she will drive 12,000 kilometers per year, 15,000 kilometers per year, or 18,000 kilometers per year. Based on this assumption, Amy estimated her total costs for the three lease options. For example, she figures that the Batcha BMW lease will cost her RM10,764 if she drives 12,000 kilometers per year, RM12,114 if she drives 15,000 kilometers per year, or RM13,464 if she drives 18,000 kilometers per year.

(a) Determine the alternative decision to be made, and the chance event for Amy's problem.

(2 marks)

(b) Construct a payoff table for Amy's problem.

(6 marks)

(c) Construct a decision tree.

(3 marks)

(d) Recommend alternative decision based on the following approach:

(i) Optimistic

(3 marks)

(ii) Conservative

(3 marks)

(iii) Minimax regret

(3 marks)

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

(4 marks)

(b) Tech wants to develop an area network that will connect its server at its computer and satellite center with the main campus buildings to improve Internet service. The cable will be laid primarily through existing tunnels, although some cable will have to be buried underground. **Figure Q3** shows network shows the possible cable connections between the computer center at node 1 and the various buildings, with the distances, in metre, along the branches.

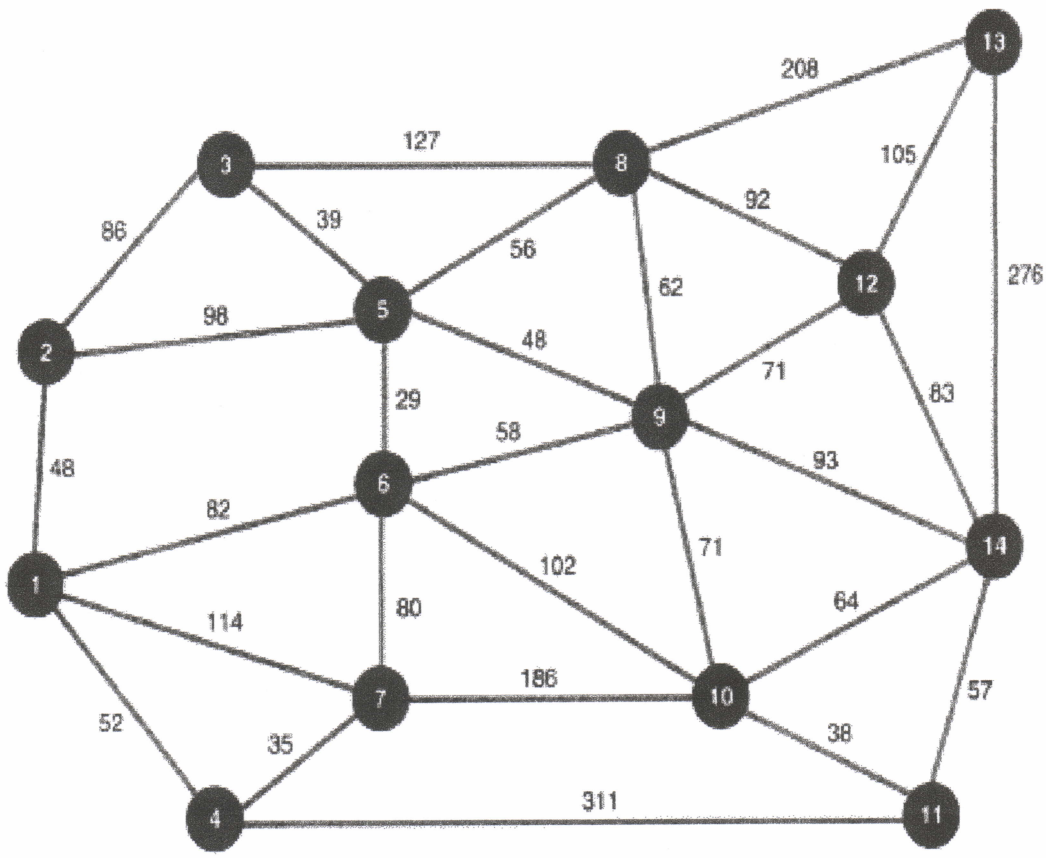


**Figure Q3**

Propose a minimal spanning tree network that will connect all the buildings and indicate the total amount of cable that will be needed to do so.

(16 marks)

**Q4** Management of the New Fangled Soft drink Company believes that the probability of a customer purchasing Red Pop or the company's major competition, Super Cola, is based on the customers most recent purchase. **Table Q4** shows the matrix of transition probabilities.

**Table Q4**

| | **To** | |
|---|---|---|
| **From** | Red Pop | Super Cola |
| Red Pop | 0.9 | 0.1 |
| Super Cola | 0.1 | 0.9 |

(a) Compute the steady-state probabilities.

(10 marks)

(b) A Red Pop advertising campaign is being planned to increase the probability of attracting Super Cola customers. Management believes that the new campaign will increase to 0.15 the probability of a customer switching from Super Cola to Red Pop.

Explain the projected effect of the advertising campaign on the market share.

(10 marks)

**Q5** A charter pilot has additional capacity for 2000 kilogram (kg) of cargo on a flight from Dallas to Seattle. A transport company has four types of cargo in Dallas to be delivered to Seattle. The number of units of each cargo type, the weight per unit, and the delivery fee per unit are shown in **Table Q5**.

**Table Q5**

| **Cargo Type** | **Units Available** | **Weight per Unit (100 kg)** | **Delivery Fee (RM)** |
|---|---|---|---|
| 1 | 2 | 8 | 22 |
| 2 | 2 | 5 | 12 |
| 3 | 4 | 3 | 7 |
| 4 | 3 | 2 | 3 |

Calculate the number of units for each cargo type using Dynamic Programming.

(20 marks)

**-END OF QUESTIONS-**