



**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
SEMESTER II  
SESSION 2013/2014**

COURSE NAME : ROAD SAFETY ENGINEERING  
COURSE CODE : BFT 40603  
PROGRAMME : 4 BFF  
EXAMINATION DATE : JUNE 2014  
DURATION : 3 HOURS  
INSTRUCTION : ANSWER FOUR (4) QUESTIONS ONLY

THIS QUESTION PAPER CONSISTS OF EIGHT (8) PAGES

- Q1** (a) Road and traffic signs are important tool to ensure a smooth and safe traffic movement and operation to road users. Categorize and draw **FOUR (4)** types of traffic signs according to Public Work Department practice. (8 marks)
- (b) In 2006, Malaysian government has launched the National Road Safety Plan 2005 - 2010. Explain briefly the **NINE (9)** strategies that stated to achieve the targets. (9 marks)
- (c) Motorcycle users are known as a group of vulnerable road users (VRU). Over a half decade ago, the special motorcycle safety program (MSP) has been implemented in order to reduce injuries and fatality rate among the motorcycle users in the country. Discuss **TWO (2)** injury reduction approaches under MSP which contributed to this scenario. (8 marks)
- Q2** (a) Illustrate step by step the production of accident database system in Malaysia. (8 marks)
- (b) Table 1 shows a data on accidents number and an hourly traffic volume within KM80 to KM88 along Federal Route F001 (Air Hitam – Yong Peng). The data are needed to study whether the traffic volume might contribute to the number of accidents.
- (i) Calculate the correlation coefficient. (4 marks)
- (ii) Develop a simple linear regression model to determine the relationship. (10 marks)
- (iii) Analyse the coefficient of determination ( $R^2$ ) of the model. (3 marks)

- Q3** (a) Illustrate the framework of data input and processing using Microcomputer Accident Analysis Package (MAAP). (6 marks)
- (b) Figure Q3 shows a collision diagram at selected blackspot location on a Federal Road in Johor. As road safety engineer, you are assigned to look further at the particular blackspot.
- (i) Perform a preliminary accidents diagnosis. (6 marks)
- (ii) Suggest in-depth site investigation. (4 marks)
- (c) Based on the findings in Q3 (b), suggest an appropriate treatment and sketch your functional design to improve the blackspot location. (9 marks)

- Q4** (a) In Malaysia, Federal Road is ranked as the road with the highest accidents rate particularly on straight road and in rural areas. As road safety engineer, you are assigned to propose a guideline regarding the possible cause of accidents and low cost countermeasures to be proposed in rural roads. (12 marks)

- (b) After an accident investigation was carried out at several primary school areas along State Road, there were three proposals to improve road safety among the school students:

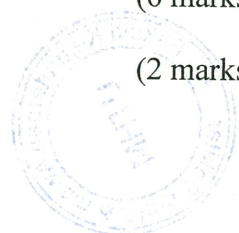
Treatment A: Introduce vertical traffic calming  
 Cost of treatment = RM 500,000  
 No. of casualties saved = 12 cases over 3 years,

Treatment B: Introduce signalized pedestrian crossing  
 Cost of treatment = RM 1,450,000  
 No. of casualties saved = 21 cases over 3 years,

Treatment C: Introduce pedestrian foot path  
 Cost of treatment = RM 700,000  
 No. of casualties saved = 15 cases over 3 years,

If the single cost of casualties worth at RM 200,000:

- (i) Calculate the percentage First Year Rate of Return (FYRR). (6 marks)
- (ii) Determine which treatment would provide the most benefit. (2 marks)



- (c) Due to complaints from local residents and evidence of accidents at KM 19 Route F005 (Batu Pahat to Pontian), the Public Works Department has decided to upgrade the existing priority junction to signalized control junction. The total cost of installation and annual maintenance cost with service life for 10 years is RM 240,000 and RM 12,000 respectively. The estimated benefit of accident reduction is around RM 45,000 per year. If the rate of interest is 9% every year, calculate the Benefit-Cost Ratio of the upgrading signalized junction.
- (5 marks)

- Q5** (a) Explain briefly Road Safety Audit - Stage 1 to Stage 4.

(16 marks)

- (b) Figure **Q5** presents an existing unsignalized intersection at KM 8 of Batu Pahat – Air Hitam road (F050). The section has over 16,000 average daily traffic and 500 vehicles turning from major to minor road during peak hours. Road users have complained about the intersection which usually experiences conflicts and congestion during peak hours. Based on Figure **Q5**, your task is to carry out Road Safety Audit stage- 3 on the particular section.

(9 marks)

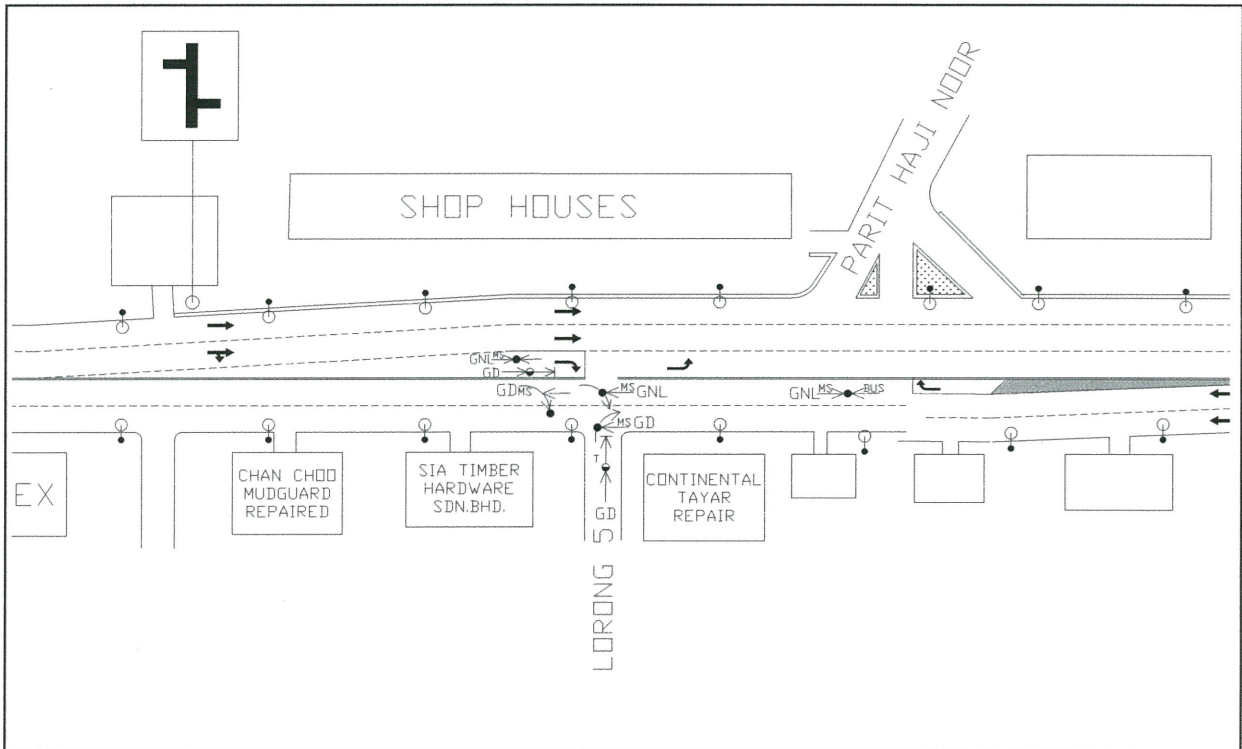
- END OF QUESTION -



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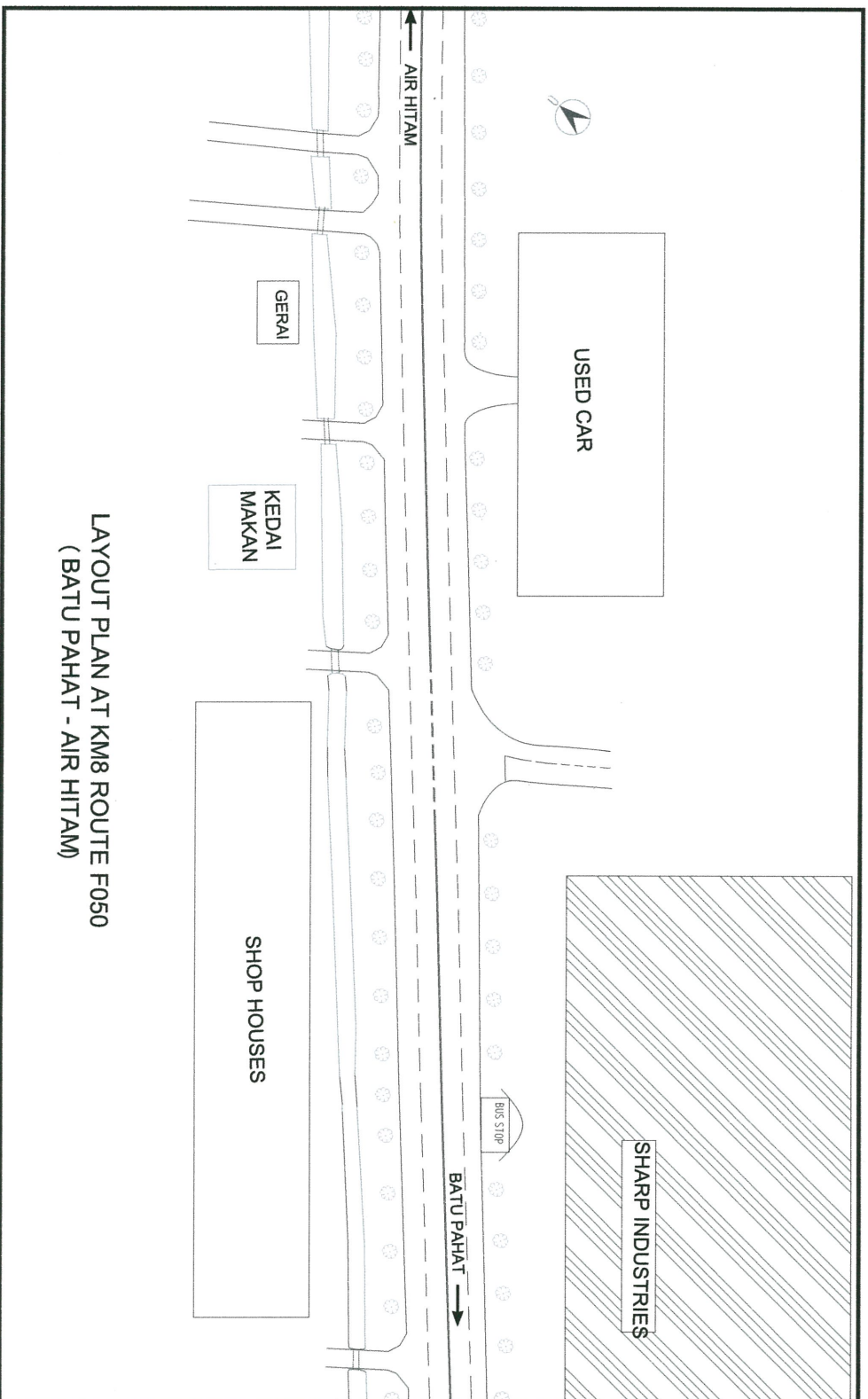


**FIGURE Q3**

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LAYOUT PLAN AT KM8 ROUTE F050  
(BATU PAHAT - AIR HITAM)

**FIGURE 05**

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#### Formulas:

$$b = \frac{SS_{xy}}{SS_{xx}}$$

$$a = \bar{y} - b\bar{x}$$

$$SS_{xy} = \sum xy - \frac{(\sum x)(\sum y)}{n}$$

$$SS_{xx} = \sum x^2 - \frac{(\sum x)^2}{n}$$

$$SS_{yy} = \sum y^2 - \frac{(\sum y)^2}{n}$$

$$R^2 = \frac{b \times SS_{xy}}{SS_{yy}}$$

$$\sigma = \sqrt{\frac{\sum x^2 - n\bar{x}^2}{n-1}}$$

$$C_v = \frac{\sigma}{\bar{x}}$$

$$\chi^2 = \frac{\left( |ad - bc| - \frac{n}{2} \right)^2}{efgh} n$$

$$r = \frac{SS_{xy}}{\sqrt{SS_{xx} SS_{yy}}}$$

$$(F/P) = (1+i)^n$$

$$(P/F) = \frac{1}{(1+i)^n}$$

$$(A/P) = \frac{i(1+i)^n}{(1+i)^n - 1}$$

$$(P/A) = \frac{(1+i)^n - 1}{i(1+i)^n}$$