



University of South Australia

If you are required to use a calculator, please note the make and model here:

Calculator Make:

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Calculator Model:

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## 2006 Mid Year Examination

Student ID Number

Student ID Number

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Family Name	
Given Names	

Division of Information Technology Engineering and Environment

School of Natural and Built Environments

Course Name: Traffic Systems Engineering

Subject Area CIVE

Catalogue Number: 5022

Examination Day: Tuesday

Examination Date: 27<sup>th</sup> June 2006

Examination Time: 14:00

Length of Exam: 2 Hours

Examination Venue: Royal Banquet Room

### Instructions to Candidates

**Reading Time: 10 min**

1. Attempt all **FIVE** questions
2. Marks for each question are shown in brackets
3. Calculators are permitted
4. This is an **OPEN BOOK** examination

## Conduct in examinations

- Students are responsible for finding out their examination times and locations and for travelling to the venue. Examination times and locations are published on the University web site and advertised on the student portal. It is recommended that students arrive at least 15 minutes prior to the advertised start time.
- Students who arrive up to 30 minutes after the published start time will be permitted to enter the examination room but will not be allowed any additional time to complete the examination.
- Students who arrive more than 30 minutes after the published start time will not be permitted to enter the examination room and will receive a zero mark for that assessment.
- All students must bring with them, and display on their desk:
  - their student identification card: or
  - an alternative form of photographic identification such as a passport or driver's license. If a student does not provide acceptable photographic identification the invigilator will compare the student's likeness with University records in order to verify the student's identity;
- Where applicable, students must also display on their desk:
  - an approved disability access plan; and/or
  - an ENTEXT Card (for students who are entitled to extra time but have not been issued with an indicator on their student identification card)
- Unless otherwise specified in the course information booklet or as an agreed provision under Section 3: Moderation and Variation, a student must not take into the examination room any item with the potential to provide them or another student with an advantage, including but not limited to:
  - text books or any other book including dictionaries
  - calculators
  - mobile telephones, personal digital assistants, messaging devices or any other electronic device
  - notes, or other written documents
  - devices or personal items
  - examination answer booklets, attendance slips or scrap paper
- Any items specified as being allowed in the course information booklet must not be enhanced or tampered with in any way that provides an additional advantage to the student or any other student.

### Procedures during the examination

- Every student must complete the attendance slip provided.
- The examination starting time may include a designated reading time for students. During this reading time, students are not permitted to write in the examination booklets but may complete attendance slips, fill in details required on the front cover of examination booklets, and make notes on loose-leaf paper provided. An invigilator will announce when the reading time has elapsed, after which students may write in the examination booklet.
- No student will commence writing answers until authorised by an invigilator. All students must stop writing when instructed by an invigilator. At the end of the examination all students must remain seated until all examination booklets have been collected.
- During an examination students are not permitted to speak to or communicate with any other student, or give or receive any form of assistance, academic or otherwise.

### Procedures for leaving the examination room

- Students are not permitted to leave the examination room in the first 30 minutes after the published starting time or during the last 10 minutes of any examination.
- After the first 30 minutes of the examination has lapsed, a student can request to leave the examination room for a short break. When approval is given by an invigilator, the student will be supervised during the period of absence.
- Students wishing to permanently leave the examination room must hand all examination booklets to the invigilator who will endorse the booklets as correctly identifying the student. Students cannot remove any examination answer booklets, scrap paper or attendance slips from the examination room.

### Breaches of examination procedures

- A breach of the examination procedures may constitute academic misconduct. Procedures are deemed to be breached even if it cannot be demonstrated that the student gained an advantage from the breach. For example, if a student takes a mobile telephone or device into the examination room but does not switch it on or remove it from their pocket, it may still constitute academic misconduct although the intent is recognised in determining an appropriate outcome.
- Breaches of the examination procedures will be recorded under Section 9: Academic Integrity of this manual whether they constitute academic misconduct or not.

### Procedures for breaches that cause disruption to an examination

- Any student disrupting the examination can be instantly dismissed from the examination room at the discretion of the chief invigilator. Where dismissal is the appropriate course of action, the chief invigilator will document the incident and provide a report to the Head of School or Director: Regional Engagement or nominee.
- The Head of School or Director: Regional Engagement or nominee will investigate the incident as either:
  - academic misconduct by following the procedures for formal inquiry set out in Section 9: Academic Integrity, or
  - misconduct under Statute 7: Student Misconduct.
- Where dismissal is not deemed appropriate by the chief invigilator, the student will be permitted to remain in the examination, and clause 6.6 will apply.

### Procedures for breaches that do not cause disruption to an examination

- If a breach is detected that does not cause disruption to the examination, or is assessed by the chief invigilator as not warranting dismissal from the examination room, the invigilator will tell the student that the breach has been detected and will be reported.
- The invigilator will document the incident and will provide a copy of this report to the Academic Integrity Officer at the relevant school within 5 working days of the incident.
- If the Academic Integrity Officer considers that the breach constitutes academic misconduct, they will investigate the incident by following the procedures for managing alleged academic misconduct set out in Section 9: Academic Integrity.
- If the Academic Integrity Officer considers that the breach does not constitute academic misconduct, they will provide academic counselling to the student.

### QUESTION 1

- (a) Explain what Traffic Impact Study is. Discuss the need, importance and data required for conducting traffic impact studies in urban areas. [10 marks]
- (b) What is an Origin-Destination (O-D) matrix and its relevance to traffic planning? Discuss the methods to derive an O-D matrix. [10 marks]

### QUESTION 2

- (a) Using the concept of functional classification of roads, explain the basic principles for selecting traffic control devices for urban intersections. What traffic and environmental factors are also considered when selecting a control device? [8marks]
- (b) Explain briefly any five roadway elements. Include function and current practices used in the design of these elements. [6 marks]
- (c) Discuss any three emerging (i.e. 'Intelligent Transport Systems') traffic control systems. Include some specific examples. [6 marks]

### QUESTION 3

- (a) A section of road has a free flow speed of 55km/h and a jam density of 367 vehicles per kilometre. Assuming under a linear speed-density relationship, calculate the density at maximum flow, the maximum flow rate and the speed at maximum flow. [4 marks]
- (b) A roadway has an average hourly traffic volume of 360 veh/h. Assuming that the arrival of vehicles is Poisson distributed, estimate the probabilities of having 0, 1, 2, 3, 4 and 5 or more vehicles arriving over a 20 second time interval. Determine the probability that the gap between successive vehicles will be less than 8 seconds. [6 marks]
- (c) One approach of an intersection with fixed time traffic signals, vehicles arrive at 500 veh/h on the approach. The cycle time of the intersection is 80 seconds, and the effective green time for the approach is 24 seconds. The saturation flow of this approach is 2000 veh/h. Find out solutions for the following situations with the assistance of a Time-Flow Diagram.
- (i) Will the queue of vehicles on the approach be unable to clear? Is the degree of saturation flow greater or less than 1 in this case? [4 marks]
- (ii) Due to a traffic incident, the saturation flow of this approach is reduced by 30 per cent. Is there any delay under the new situation? How many vehicles may experience delay? [6 marks]

#### QUESTION 4

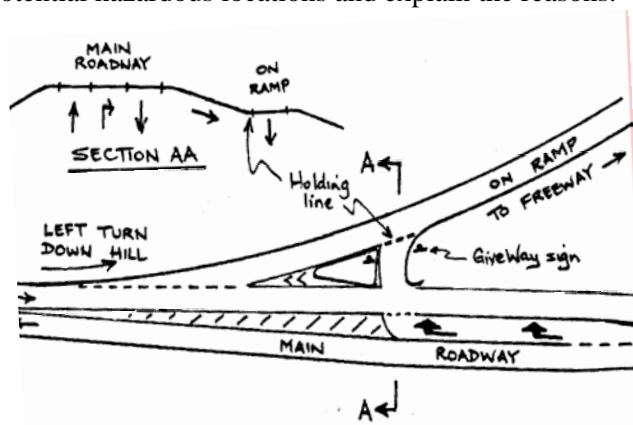
- (a) Traffic conflict techniques are an indirect method for investigating the potential occurrence of road crashes. Conflict analysis can be used to identify hazardous locations for improvement purposes. To undertake traffic conflict studies, conflict definitions and data collection methods need to be developed beforehand. Based on your understanding, answer the following questions:
- (i) What are the two commonly used conflict definition and data collection methods? [4 marks]
  - (ii) Describe their applications and associated advantages and disadvantages with each of the methods. [6 marks]
- (b) Explain what FOUR-STEPS model is. [4 marks]
- (b) A day Mr Smith's travel arrangement was as follows:

Home to work  
 Work to shopping centre  
 Shopping centre to home

How many trips were produced; how many trips were generated; and what was the total number of trips Mr Smith made on that day? [6 marks]

#### QUESTION 5

- (a) What Road Safety Audit is? What are the requirements for a road safety auditor? State the procedures in a road safety audit process. [8 marks]
- (b) For a section of rural highway, vehicle speed on the main road is 60km/h. The main road also provides the opportunity for vehicles to access to a freeway through a ramp, the speed of the freeway is 100km/h. A GIVEWAY sign is located at the holding line for vehicles turning right to the ramp then go to the freeway. The plan and section views of the road section are provided in the sketch. Identify the potential hazardous locations and explain the reasons. [12 marks]



END OF QUESTIONS