

UNIVERSITY OF SOUTH AUSTRALIA

DIVISION OF INFORMATION TECHNOLOGY, ENGINEERING AND THE
ENVIRONMENT

School of Geoinformatics, Planning and Building

Semester 1, 2004

Introduction to Mapping Sciences : GEOE 1009 / 13048

Time Allowed : 2 hours + 10 minutes reading time

General Instructions to Candidates

Marks for questions are shown at the beginning of each question

Answer **ALL** questions from **Section A** and **ANY FOUR** questions from **Section B**.

Programmable calculators are permissible.

Please ensure the front of your answer books are completed with your name, student I.D. number, course and section of the examination.

SECTION A

QUESTION 1

(25 Marks)

You are a GIS officer for the State Government within their State Operation Centre - Disaster Management. The State has experienced one of its worst fortnights of winter storms. Many experts suggest that the storms are 1 in 100 years storms.

During the two weeks the centre has collected a lot of statistical data about storm damage across the metropolitan area.

Date	Storm Damage	Location	Dwelling Damage	Industry Damage	Vehicle Damage	Environmental Damage	Notes
28/8 – 30/8	Wind	Glenelg to Henley Beach	360 roofs	2 roofs	100	100 trees felled	
29/8 – 30/8	Wind	Norwood and surrounding suburbs	10 roofs			115 trees felled	
29/8 – 2/9	Hale	Hallett Cove to Norwood, 1km wide	140 roofs	16 roofs	250		
30/8	Wind	Tea Tree Gully and surrounding suburbs	40 roofs			70 trees felled	
	Wind	Elizabeth and surrounding suburbs	28 roofs	24 roofs & stock	500	60 trees felled	General Motor Holden substantial damage to stock
	Wind	Parafield Airport					10 Light Aircraft
6/9 – 7/9	Hale	Parafield to Golden Grove	295 roofs	3 roofs	84		30 Light Aircraft
10/9 – 15/9	Flooding	Gawler River breaks its banks, large flooding in Virginia area	60 flooding	??	40		\$250,000 loss in market gardens
11/9 – 13/9	Flooding	Unley, Wayville flooding, stormwater infrastructure unable to cope	28 flooding	40	3		
12/9	Flooding	Glenelg gates fail at lock	70 flooding		20		

Adelaide Airport – Bureau of Meteorology (BOM) recordings							
Date	Highest Wind Speed	Wind Direction	Rainfall (24h)	Date	Highest Wind Speed	Wind Direction	Rainfall (24h)
28/8	85 km/hrs	SW	13mm / Hale	8/9	31 km/hrs	W	-
29/8	91 km/hrs	SSW	8 mm	9/9	22 km/hrs	WSW	-
30/8	80 km/hrs	SSW	5 mm / Hale	10/9	89 km/hrs	SW	8 mm
1/9	38 km/hrs	SW	24 mm	11/9	64 km/hrs	SSW	27 mm
2/9	30 km/hrs	W	4 mm	12/9	20 km/hrs	SW	15 mm
6/9	18 km/hrs	WNW	15 mm / Hale	13/9	15 km/hrs	SSW	26 mm
7/9	60 km/hrs	W	18 mm	14/9	23 km/hrs	SW	20 mm

Your job is to provide mapping reports for the post-briefing to senior management. Using the above data, plus any additional data eg. Topographic, administrative boundaries (suburbs, councils, etc...):

- a. Discuss in detail how you would portray the data using colours, symbology, text and charts to depict storm damaged areas and / or severity of damage.
- b. Discuss the types of maps, the design, page size and any additional data that would be required to provide informative products to senior management.

QUESTION 2**(17 Marks)**

A series of cycling maps have been requested by Bike SA for the Adelaide Hills. These maps are for consultation with local councils to identify appropriate trails within the hills. The maps are to be published at a scale of 1:5000 in a poster format (A0 page). Each poster contains a general reference map of the area at 1:50000. The posters will also contain cycle information for major towns, rail stations, restaurants, car parking, etc. For these maps to be useful to councils planners the maps must contain specific information, eg. trail types (tourist, downhill), distance, difficulty and safety.

The map series must contain several base datasets; relief (contours) at 5 metre intervals, watercourses, road networks (identifying road types and road names), buildings and significant structures (identified by symbology), vegetation structure.

A general reference grid is required for each map. This reference grid should be user friendly and easy to interpret for planners.

- a) Discuss in detail the design of this map series taking particular care to consider the issues of symbol and text design to meet the primary aim of the map series. Use diagrams if necessary.
- b) Briefly discuss how these (cycle) maps vary from a thematic map as in question 1.

QUESTION 3**(10 Marks)**

- a) The term "Geoidal Height" is the difference from what two elements ?
- b) List and briefly describe the four parameters to define a geodetic datum ?
- c) A native vegetation area measures 98mm by 211.5mm on a 1:5,000 scale topographical map. What is the area of the native vegetation on the ground in hectares?
- d) Describe the difference between conic and cylindrical map projections ?

SECTION B

QUESTION 4**(12 Marks)**

- a) List, explain and sketch the four most common schemes of classification of a statistical surface?
- b) There are several ways to describe colour systems.
 - (i.) Explain the definition CIE colour system ?
 - (ii.) Where are RGB and CMYK used ?
- c) What are the four basic geographic variables, explain each of them and use real world features for examples ?

QUESTION 5**(12 Marks)**

- a) The best two methods to represent the landform surface in maps are contours and hill shading (separately and together).
 - (i) Discuss and compare the use of contours and hill shading for representing the landform surface ?
 - (ii) To facilitate the interpretation of contours there are several widths and styles. List and briefly explain these ?
- b) Make a list of the essential components that constitute a map ?

QUESTION 6**(12 Marks)**

With brief comments, list the possible sources of data for the construction of maps which show:

- a) Population statistics associated with health data for a continent such as South East Asia.
- b) Topography, vegetation, environmental and drainage data for a new highway development.

QUESTION 7**(12 Marks)**

- a) Explain the difference between “spectral colour” and “artificial colour” ?
- b) Who and when were “hachures” invented? Who were the greatest uses of this method ?
- c) What is “Typography Form” and what are the consideration ?

QUESTION 8**(12 Marks)**

- a) Generalisation is used frequently during mapping. Explain why you would generalise data on a map. There are two methods of generalisation, list them and explain the differences between them ?
- b) Briefly describe the steps required to extract and plot a profile on the Earth’s surface from a contour map ?
- c) There has been a shift away from producing maps in hardcopy form and a move to delivering maps and spatial information via the internet. List and briefly discuss the advantages of an Internet Map Server ?

QUESTION 9**(12 Marks)**

- a) In symbol design there are three classes of data / scale. Use a table matrix to briefly describe these classes ?
- b) List and describe the three types of “north” indicated on a map ?
- c) In data collection there are five primary forms of surveying information, list and briefly describe them ?