

UNIVERSITY OF SOUTH AUSTRALIA

DIVISION OF INFORMATION TECHNOLOGY, ENGINEERING AND THE
ENVIRONMENT

School of Geoinformatics, Planning and Building

Semester 2, 2000

Geodetic Science 2 : 09091

Time Allowed : 3 hours + 10 minutes reading time

General Instructions to Candidates

This examination is an open book exam.

Total marks = 100

This examination paper contains six (6) questions. Candidates are required to attempt FOUR questions only.

All questions are of equal value.

Please ensure that the front of the answer book is completed with your name, student I.D. number, course, subject name and section of the examination (if applicable).

Attempt any FOUR of the following SIX questions.

Question 1 [25 marks]

Briefly describe the following:

a) the historical development of geodesy; and

[15 marks]

b) the applications of geodesy.

[10 marks]

Question 2 [25 marks]

At a place of latitude $30^{\circ} 30' 00''$ North, an observation was made on a star at a certain time such that the star's hour angle was $4^{\text{h}} 30^{\text{m}} 00^{\text{s}}$. Given that the declination of the star is $22^{\circ} 30' 00''$ North, calculate the altitude and azimuth of the star.

Question 3 [25 marks]

a) Outline the development of the Australian Geodetic Datum and briefly discuss the new features of the 1994 Geodetic Datum of Australia (GDA).

[12 marks]

b) Describe with the aid of diagrams the relationship between ellipsoid and geoid heights.

[7 marks]

c) Define the following terms: inverse flattening, sea level or geoidal distance, grid convergence, ellipsoidal distance, grid distance, plane distance and meridian convergence.

[6 marks]

Question 4 [25 marks]

a) Define the following terms and their inter-relationships:

- Earth Rotation Time
- Universal Time Coordinated (UTC)
- Atomic Time

[12 marks]

b) What is the hour angle of a sun when it is observed on the meridian of the observation station? Why is it important to observe the sun before and after meridian transit for the determination of azimuth?

[8 marks]

c) What is the declination of the sun when it crosses the tropic of Capricorn?

[5 marks]

Question 5 [25 marks]

a) Explain with the aid of diagrams what are the deflections of the vertical.

[15 marks]

b) Outline a procedure which can be used to measure the deflections of the vertical.

[10 marks]

Question 6 [25 marks]

Outline the basis and principles of:

a) Vincenty's formulae for computations on the ellipsoid, and

[15 marks]

b) Redfearn's formulae for the conversion of ellipsoidal coordinates to grid coordinates.

[10 marks]