

**UNIVERSITY OF SOUTH AUSTRALIA
SCHOOL OF GEOINFORMATICS, PLANNING AND BUILDING**

**GEODETTIC SCIENCE 4
PHYSICAL GEODESY
SEMESTER 1 2002**

TIME: 2 HOURS

GENERAL INSTRUCTIONS

Attempt any **three (3)** questions
All questions are of equal value

QUESTION 1:

a) Define with the aid of diagrams the following height systems:

- Geopotential numbers
- Dynamic heights
- Orthometric heights
- Helmerts heights
- Normal heights
- Heights above the ellipsoid

b) Discuss their significance, use and where applicable their inter-relationship.

QUESTION 2:

What is a gravity anomaly?

Describe and discuss the use and inter-relationship of the various types of isostatic and non-isostatic gravity anomalies.

QUESTION 3:

a) Define with the aid of diagrams where applicable:

- i) gravitational force and gravity
- ii) the potential at a point P due to an irregular shaped body
- iii) normal potential and normal gravity
- iv) disturbing potential

b) Derive the relationship between the disturbing potential and the geoid-ellipsoid separation.

QUESTION 4:

a) Define the Geoid.

b) Stokes' Formula may be represented by

$$N = \frac{R}{4\pi G} \iint_{\sigma} \Delta g S(\sigma) d\sigma$$

i) What is the significance of this formula.

- ii) Show a general shape of the function $S(\square)$
- iii) What correction needs to be made if:
 - a) the mass of the earth does not equal the mass of the reference ellipsoid.
 - b) the potential of the earth does not equal the potential of the reference ellipsoid.
- iv) Show with the aid of diagrams what the effects of ignoring the corrections discussed in iii) above.