

本科試題共含兩頁兩部分, 此為第一頁

國立交通大學 98 學年度第 1 學期

博士班資格考筆試考試試題

土木工程學系 測量組(戊) 科目：物理大地測量 選考學生數：3 考試時間：120min

共 | 頁，第 | 頁

This part is a “close book” exam (for one hour).

1. In some detail, what is the meaning of geoid undulation? What are the main applications of geoid undulation? (25%)
2. What is the definition of dilution of precision (DOP) used by a GNSS (global navigation satellite systems) positioning technique? Is it a good practice that we sometimes exclude a consideration of unit-weight measurement variance in defining DOP? (25%)
3. How can the method of least-squares collocation be implemented, as far as its theory, application and limitation are concerned? Is there any other comparative methodology? (25%)
4. Introduce some recent low earth orbiters that have contributed to an advancement of Physical Geodesy. What are their observation principles and data-analysis strategy, respectively? (25%)

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成績為兩部分之平均

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土木工程學系 測量組(戊) 科目：物理大地測量 選考學生數：3 考試時間：120min

共 2 頁，第 1 頁

Close-book exam

1. Explain the remove-restore technique for geoid determination, and how do we use this technique to calculate a local geoid (At least the method, the procedure and data sources should be included in answers)? (40%)
2. Normally, we set the mass M of the reference ellipsoid equal to the mass of the earth and the value of the potential W on the reference ellipsoid equal to the value of potential of the geoid. Then applying Bruns and Stokes theorems, we get the following formulae for the calculations of the disturbing potential T and then the geoidal undulation N :

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

$$N = \frac{R}{4\pi\gamma_0} \iint_{\sigma} \Delta g S(\psi) d\sigma$$

where σ is the unit sphere, $S(\psi)$ is the Stokes' function, R is a constant, γ_0 is a reference normal gravity, and g is gravity anomalies.

Generalize these formulae for an arbitrary reference ellipsoid which is different from the earth in mass (say, δM) and from the geoid in potential (say, δW). (60%)