

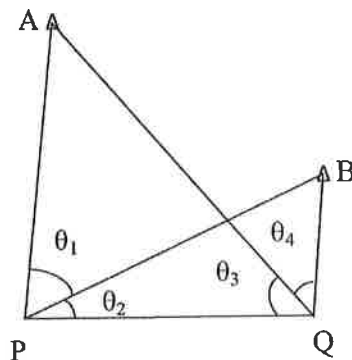
# 國立交通大學 102 學年度第 1 學期

## 博士班資格考筆試考試試題

土木工程學系 測量組(戊) 科目：基礎科目(測量學、測量平差) 選考學生數：2 考試時間：120min

Close book 共 1 頁，第 1 頁

- As shown in the following figure, A, B are stations with known coordinates, while P, Q are stations of which coordinates to be determined. Four angles are measured from stations P, Q.
  - Please provide two different computation schemes for the coordinates of P and Q (10%) and estimate the uncertainties propagated from the observations to the coordinates, assuming that the coordinates of A and B are error free (15%). Please provide the detail equations for the computation and their derivation.
  - Please compare these two computation schemes (5%).



- You are given differential height measurements and benchmark-to-benchmark distances collected in a leveling network. You will need to carry out a network adjustment to determine the elevations of the benchmarks.
  - You can use either the method of observation equations or the method of condition equations to adjust the height measurements. Explain the two methods and show the advantage and disadvantage for each of the methods. (15%)
  - If you choose to use the method of condition equations, you face rank deficiency in the adjustment. Show a method to remove the rank deficiency. (15%)
- TWD67 and TWD97 are the two coordinate systems in Taiwan. We have to do the coordinate transformation between these two coordinate systems in data integration. Please provide two possible procedures for the coordinate transformation between TWD67 to TWD97. (15%). Please compare these two schemes. (5%)
- Please detail all you know about the robotics total station including components, concepts, applications, advantages and limitations. (20%)

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## 博士班資格考筆試考試試題

土木工程學系 測量組(戊) 科目：衛星大地測量 選考學生數：2 考試時間：60min

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共 1 頁，第 1 頁

1. Compare and explain the following times used in satellite geodesy:  
UT1, UTC, Sidereal time, AT, TAI, GPS time (6x5%=30%)
2. Answer the following questions concerning ITRF:
  - (a) What is ITRF? How is an ITRF realized? (20%)
  - (b) What is the latest ITRF? What data are used in establishing the latest ITRF (20%)
3. Atmospheric corrections are standard corrections for measurements using sensors at the microwave bands. Show such corrections are applied in following cases: (a) GPS, (b) satellite altimeter(c) EDM. (3x10%=30%)

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## 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：2 考試時間：60min

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共 1 頁，第 1 頁

1. The height difference data collected by satellite altimetry offer the observation equivalent to vertical deflections.
  - (1) Briefly elaborate on the principle to determine gravity anomaly and geoidal undulation by altimetry data. You do not need to work out the mathematical details; just describe the key components of the principle. (20%)
  - (2) The height difference data covers only the oceanic area. How do you deal with the boundary of costal line? (10%)
  - (3) Suppose we do not have any gravimeter to measure gravity on land, can we use traditional geodetic instruments –total station theodolite and apply the approach to determine the geoidal undulation? (10%)
  - (4) Please suggest an approach to validate the oceanic geoidal undulation model. What kind of data you need in this validation? (10%)
  
2. In the geoid determination, we often divide geoid into long, short wavelength and residual terrain related effect.
  - (1) What is the impact inflicted by biased introduced by different data source? (15%)
  - (2) Conventionally, terms of the first two degrees are omitted from the formula for geoid determination, what kind of assumptions we need to make for the reference ellipsoid and Earth potential? (10%)
  - (3) If we are not certain about the potential constant  $W_0$ , how do we determine it by introducing GPS measurement? (15%)
  - (4) If the gravity data is collected by airborne gravimeter, what kind of difficulty we have compared with terrestrial approach? How do we overcome it? (10%)