NATIONAL EXAMS – DECEMBER 2017

04-Geol-B2, TERRAIN ANALYSIS

3 hours duration

NOTES TO THE CANDIDATES

If doubt exists as to the interpretation of a question, include at the beginning of the relevant solution, on the solution and answer side of the exam work book, a **clear statement outlining any assumptions that were made**.

This is an **open book exam**.

Approved Casio or Sharp calculator is permitted.

Record your solutions and answers NEATLY AND LEGIBLY on the right-hand side of the exam work book; the left-hand side is reserved for rough calculations only and MUST NOT be used to record solutions and answers.

Illegible or untidy solutions will NOT be corrected.

INSTRUCTIONS SPECIFIC TO THIS EXAM

This exam contains SIX (6) questions, however FIVE (5) questions constitute a complete exam paper. The first five questions as they appear in the answer book will be marked, for a **total of 100 points**.

(20) **Question 1: Basic definitions**

Define the following terms. Wherever appropriate, you are encouraged to illustrate your answers with neat, clearly labeled sketches and/or diagrams.

a) Synthetic Aperture Radar (SAR) [5 marks]

b) Atmospheric windows [5 marks]□

c) Spatial resolution. [2.5 marks] □

d) Atmospheric correction [2.5 marks]

e) Slope [2.5 marks]

f) Albedo [2.5 marks]

(20) **Question 2: Radar remote sensing**

a) What is meant by RADAR? Discuss the advantages and disadvantages of RADAR remote sensing, using example applications wherever possible. [15 marks]

b) What wavelength would be required in principle to allow a real aperture RADAR system with an antenna length of 5m, at a height of 1km, to resolve two objects separated by 4m along track (in the azimuth direction), at a depression angle□γ of 65□? [5 marks] □

(20) **Question 3: LANDSAT imagery**

There are several types of Landsat sensors. Discuss and explain why data from the Landsat TM sensor might be considered more useful than data from the original MSS sensor. Your answers should include (but not limited to) their spatial, spectral, and radiometric resolutions. [20 marks]

(20) **Question 4: Identification of terrain features on Aerial photo** (You will need to use the pocket stereoscope for this question).

Use "Plate 4-19, Page 282. Bottleneck earthflows, Peace River valley, Alberta-British Columbia border" from Mollard, J.D. and J.R. Janes, Airphoto Interpretation an the Canadian Landscape. Energy, Mines and resources Canada, 1984.

Answer the following questions in reference to the structures and terrain features shown in the photos:

a) What direction is the river flowing? What is your evidence? [2.5 marks]

b) Are the islands in the river stable over time? What is your evidence? [2.5 marks]
c) Is there evidence of erosion along the slope adjacent to the river? List all of your evidences. [5 marks]
d) Briefly describe what you see at points # 3 and 4, at points # 10 to 14, and points # 15 and 16. [10 marks]

(20) **Question 5**

a) List and explain at least five (5) elements of image interpretation. [10 marks]
b) One of the last Landsat types is called Landsat 8, describe how are Thermal Infrared sensor thermal bands aboard this Landsat used? [10 marks]

(20) **Question 6: Interpretation of Aerial Photos** (You will need to use the pocket stereoscope for this question).
Use "Plate 2-22, Page 211. Karst features, southwest of the Ram Plateau, Northwest Territories" from Mollard, J.D. and J.R. Janes, Airphoto Interpretation an the Canadian Landscape. Energy, Mines and resources Canada, 1984.

Answer the following questions in reference to stereopair photos:
a) Define what you see at points # 1 and 2. What evidence is there to support your answer? [5 marks]
b) Define what you see between points # 6 and 7; what is your evidence? [5 marks]
c) Define what you see at points # 10, and explain how they formed. [5 marks]
d) Briefly describe how using the pocket stereoscope can aid you in feature identification. [5 marks]