UNIVERSITY OF MINES AND TECHNOLOGY, TARKWA

SECOND SEMESTER EXAMINATIONS, MAY 2018

COURSE NO: GM, GL, MN 350
COURSE NAME: **MINERAL RESOURCE EVALUATION**
CLASS: **GM, GL, MN III** TIME: 3 HOURS

Name**:** _____Index Number: _____

ANSWER ANY FOUR QUESTIONS

Q1.

i. What is the difference between ore and waste? **(5 marks)**
ii. What factors may be considered in determining the power index used in inverse distance weighting? **(5 marks)**
iii. What is "regression effect"? **(5 marks)**
iv. Indicate two limitations of geometric methods of reserve estimation. **(5 marks)**
v. Explain any two criteria that you may consider to control sample compositing. **(5 marks)**

Q2.

The mean grade over a square panel of side 40m is to be estimated from the four samples shown in Figure 1. Determine the arithmetic mean of the block at 95% confidence interval when the variability of the grade can be characterised by an anisotropic spherical semi-variogram model with the following parameters:
$C_0 = 5(g/t)^2$; $C = 25(g/t)^2$; $a_{E-W} = 50m$; $a_{N-S} = 100m$

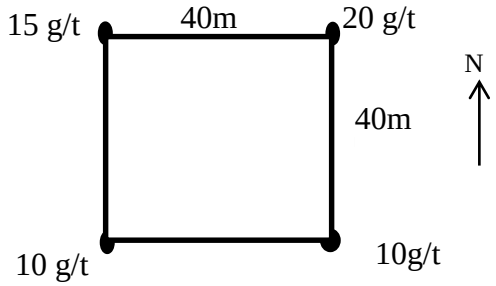

Figure 1.

(25 marks)

Q3.

The concentration of gold in an old tailings dump is known to be anisotropic and is adequately characterized by a spherical model with the following parameters:

$C_0 = 0.8$ ppm^2 $a_{E-W} = 100$ m
$C = 1.2$ ppm^2 $a_{N-S} = 300$ m

Find the extension variance of an estimate of gold in a square block, with the sides measuring 100 m for:

i. Central sample point
ii. Floating sample point

Comment on any difference in the values obtained in a) and b) in respect of exploration.

(25 marks)

Q4.

The data contained in Table 1 are the experimental semi-variogram values calculated for copper grades of 10m drill core samples. Plot the semi-variogram on the graph paper provided. Fit an appropriate single structure spherical semi-variogram model to the experimental semi-variogram showing clearly how you produced the model.

(25 marks)

Table 1

Lag Distance (m)	Semi-variance $(\%)^2$
10	5.0
20	6.3
30	7.7
40	8.6
50	8.9
60	9.5
70	11.0
80	10.1
90	9.7
100	11.2

Q5.

Four diamond drill holes through an auriferous bench are shown in Table 2 Using inverse distance cubed method evaluate the grade at a point located at (300,300) using all four holes for the case where the grade variation is anisotropic with the direction of anisotropy oriented N75°E and the anisotropy ratio is equal to 2. **(25 marks)**

Table 2

BH	EASTING (m)	NORTHING (m)	GRADE (g/t)
B1	100	100	16
B2	700	-100	4
B3	600	500	5
B4	-300	600	18

Examiner: Assoc Prof S. Al-Hassan