## Eighth Semester B.E. Degree Examination, Aug./Sept.2020

**Mining Geostatictics** 

Time: 3 hrs.

Max. Marks: 100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

## PART - A

Provide a brief account on various schools of geostatistics.

(06 Marks)

Explain in detail polygonal method of ore reserve estimation.

(04 Marks)

Determine average grade and average thickness of an iron ore deposit based on the information in Fig.Q1(c) and Table.1 below:

Area of	Sample	Thickness	Grade
triangle	Points	in m	(Fe %)
in m <sup>2</sup>		6.9	
$\Delta A =$	1	5.2	56
1300	2	3.8	60
$\Delta B = 1100$	3	4.6	62
$\Delta C = \Delta$	4	5.1	64
1200	5	4.1	58

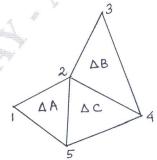


Table 1: Thickness and Fe% at different sample points

Fig.Q1(c): Relative position of samples

Define semi-variogram function.

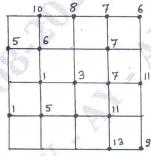
(10 Marks)

(02 Marks)

Derive mathematical relation among semivariance, variance and covariance.

(04 Marks)

- Provide a detailed account of various mathematical models of semivariogram.
- (14 Marks)
- Explain in detail the characteristics of a semi-variogram fitted with spherical model. Illustrate your answer with neat sketch.
  - b. Following are the sample values obtained in a bedded deposit in grid form as shown in Fig.Q3(b). Each grid is of square shape calculate semi-variogram in four principal directions. Also calculate mean semivariogram. (12 Marks)



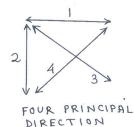


Fig.Q3(b): Sample values obtained in a bedded deposit.

- 4 Define and explain the following:
  - Isotropy and Anisotropy. a.

(05 Marks)

Stationarity. b.

(05 Marks)

Regularization.

(05 Marks)

Nugget effect.

(05 Marks)

## PART - B

5 Define Estimation variance and extension variance.

(02 Marks)

Derive an expression for estimation variance of a block by a sample.

Consider a point semi variogram  $\gamma$  (h) linear for h < 2 and searching a sill c = 1.0 at h = 2. There is no nugget effect. A square block – V of size  $3 \times 3$  is estimated by a point sample. S located at a corner of the square as shown in Fig.Q.5(c). Calculate estimation variance of the block.



Fig.Q.5(c) Square block v and sample s at corner

Derive an expression for kriged estimate and error for a block with two samples. (15 Marks) 6 Following are the values for the configuration (Fig.Q.6(b).



 $\bar{\gamma}(v, v) = 0.60 (\%)^2$  $\bar{\gamma}(s_1, v) = 0.60 (\%)^2$  $\bar{\gamma}$  (s<sub>2</sub>, v) = 0.80 (%)<sup>2</sup>

 $\bar{\gamma}(s_1, s_2) = \bar{\gamma}(s_2, s_1) = 0.90 (\%)^2$ Fig. Q.6(b)

 $g_1 = 3\%$ ,  $g_2 = 2\%$ .

Notations used are having usual meaning. Calculate Kriged estimate of block V and the associated kriging variance. (05 Marks)

- 7 Describe in brief the following:
  - Point kriging cross valiation method.

(06 Marks)

b. Block kriking.

(07 Marks)

Grade – tonnage relation.

(07 Marks)

- 8 Illustrate the following:
  - Mis classified tonnages. a.

(07 Marks)

Grade control.

(07 Marks)

Geo statistical optimization of drilling.

(06 Marks)