10MN832

Eighth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Mining Geostatistics

Time: 3 hrs.   Max. Marks:100

Note: *1. Answer any FIVE full questions, selecting atleast TWO questions from each part.*
2. Standard normal distribution table may be used, if required.

PART – A

1 a. Describe various schools of geostatistics. **(06 Marks)**
   b. Explain polygonal method of ore server estimation with suitable example. **(07 Marks)**
   c. Explain triangular method of ore reserve estimation with suitable example. **(07 Marks)**

2 a. Define semivariogram and also describe various characteristics of semivariogram with neat sketch. **(10 Marks)**
   b. Explain briefly various theoretical models of semivariogram. **(10 Marks)**

3 Describe the following practical problems associated with geostatistical modeling of ore body.
   a. Isotropy and anisotropy
   b. Stationary
   c. Nugget effect
   d. Regularization. **(20 Marks)**

4 a. Prove : $\gamma(h) = \partial^2 - cv(h)$ notation s used have usual meaning. **(10 Marks)**
   b. Assume that samples have been taken at equal intervals along a drive. Some samples are missing and the values obtained are given on Fig.Q4(b). Calculate semivariogram for lag interval of 1, 2 and 3.
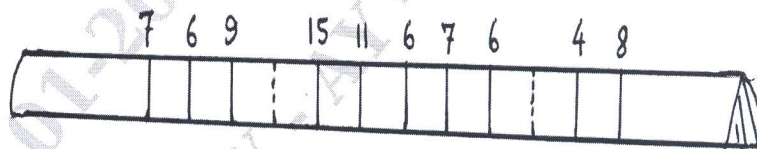

Fig.Q4(b) Sample values obtained along drive **(10 Marks)**

PART – B

5 a. Define extension and estimation variance. **(02 Marks)**
   b. Determine estimation variance while estimating a block of volume V by a set of samples S_i. **(08 Marks)**
   c. Consider a point semivariogram $\gamma(h)$ linear for $h < 2$ and reaching a sill $c = 1$ at $h = 2$. There is no nugget effect. Determine estimation variance while estimating a square block V of size 3×3 by a point sample S located at a corner of the square. **(10 Marks)**

6 a. Determine kriged estimate for a block of ore by two samples. (16 Marks)
   b. Calculate Kriged estimate of block V and the associated Kriging variance based on the following information :
   $\bar{\gamma}(v, v) = 0.60\ (\%)^2$
   $\bar{\gamma}(s_1, v) = 0.60\ (\%)^2$
   $\bar{\gamma}(s_2, v) = 0.80\ (\%)^2$
   $\bar{\gamma}(s_1, s_2) = \bar{\gamma}(s_2, s_1) = 0.90\ (\%)^2$
   $g_1 = 3\%$, $g_2 = 2\%$.
   Notations used have usual meaning. (04 Marks)

7 a. Given an estimate of mean as 65% Fe and a standard deviation of 10% in an iron are deposit, determine the proportion of iron ore i) above 60% Fe, ii) between 60% and 62% Fe grade. (06 Marks)
   b. Describe geostatistical structural analysis. (08 Marks)
   c. Describe the principle underlying point kriging cross validation. (06 Marks)

8   Describe the application of geostatistical methods in :
   a. Optimization of drilling programme (06 Marks)
   b. Grade control (06 Marks)
   c. Misclassified tonnages–actual vs estimated. (08 Marks)

* * * * *