

B. E. Semesters Final Examinations, 2013
7th Semester Mining Engineering

Elective-I: Geostatistics (MN-706/I)

Full Marks: 70

Time: 3 hours

Question numbers 1 and 6 are compulsory. Answer another two questions from each half. Figures on the right-hand side margin indicate full marks.

1ST Half

1. In the following table, element concentration values of Fe₂O₃ and SiO₂ in a borehole of a mineral deposit (values are in %). Compute correlation coefficient and fit a regression equation of Y on X to the form $Y = A + BX$ ($Y = \text{Fe}_2\text{O}_3$ and $X = \text{SiO}_2$)

Distance	Fe ₂ O ₃	SiO ₂	Distance	Fe ₂ O ₃	SiO ₂	Distance	Fe ₂ O ₃	SiO ₂	Distance	Fe ₂ O ₃	SiO ₂
0.00	24.80	3.50	5.00	40.40	1.77	10.00	34.40	1.87	15.00	23.80	3.33
0.50	22.40	0.96	5.50	40.00	1.32	10.50	22.80	2.29	15.50	21.60	2.17
1.00	19.80	1.28	6.00	15.20	1.69	11.00	26.60	3.91	16.00	27.60	3.22
1.50	27.80	0.89	6.50	17.60	2.18	11.50	32.40	3.34	16.50	19.80	2.70
2.00	25.80	0.49	7.00	24.20	2.90	12.00	27.40	4.34	17.00	27.80	2.76
2.50	23.00	0.52	7.50	19.40	3.30	12.50	25.80	3.20	17.50	21.20	2.11
3.00	34.40	0.80	8.00	35.30	2.11	13.00	31.40	3.74	18.00	19.00	2.34
3.50	29.60	1.33	8.50	31.40	2.00	13.50	26.80	3.04	18.50	28.60	1.23
4.00	30.80	1.19	9.00	28.21	1.99	14.00	24.40	1.68	19.00	24.80	2.14
4.50	35.80	1.18	9.50	34.00	2.11	14.50	25.60	2.42	19.50	23.40	1.59

(15)

2. The following runs were obtained by SRT in his last 50 innings.

66	62	45	79	32	51	56	60	51	49
25	42	54	54	58	70	43	58	50	52
38	67	50	59	48	65	71	30	46	55
82	51	63	45	53	40	35	56	70	52
67	55	57	30	63	42	55	58	44	74

Draw a cumulative frequency curve after making frequency distribution table. Hence find the proportion of innings securing more than 50 runs. Also find out the median, mode, first and third quartiles and standard deviation.

(10)

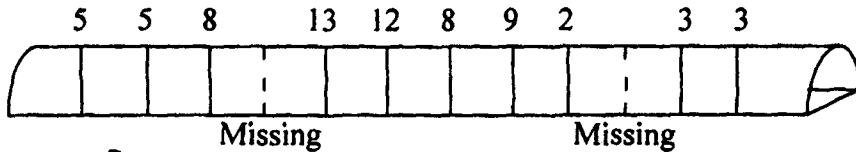
3. Explain the concept of Random variable and Joint Frequency function in the light of mineral inventory estimation. (10)
4. Write down the various steps of sample design for geostatistical analysis and decision making. (10)
5. a) Write short notes on Stem-and-Leaf Displays of geostatistical data.
 b) Write short notes on Probability sampling (5+5)

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SECOND HALF

6. a) What is and Semivariogram?

b) Samples of zinc ore have been taken at equal intervals along a drive. Some samples are missing and the values obtained are given below:



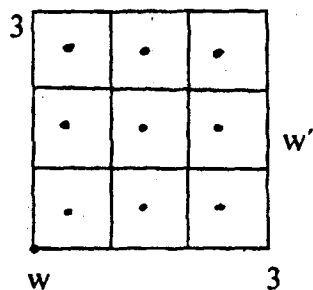
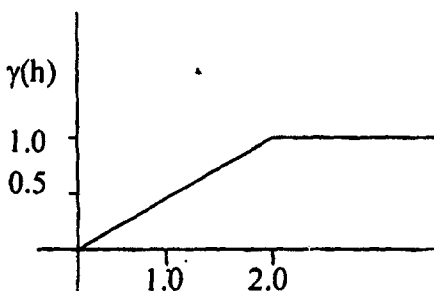
Calculate the values of Correlogram for lags of 2 to 3.

(3+10)

7. Kriging error of a block of ore W to be estimated using n supports, w_i ($i = 1, 2, 3 \dots n$) with point regionalized variable x_i , known. The mean grade (μ) is unknown. There is no restriction to the size of the samples, or their position and orientation with respect to W . Generalized the relations, show in a Matrix form also.

(11)

8. Calculate the average value Point Semivariogram ($\bar{\gamma}$) of a metal accumulation in a bedded deposit stating possible cases. The model accepted is represented in the below mention figure.

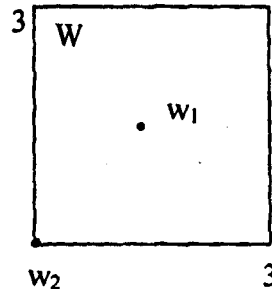
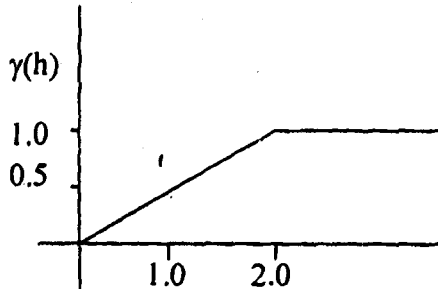


(11)

9. Establish relation between point Semivariogram and Regularized Semivariogram.

(11)

10. a) In a deposit of 50 million tones, it is found that the average grade of Cu is 0.30% and cut-off grade is 0.40% and the variance is $0.01(\%)^2$, find out the percentage and quantity of ore above the cut-off grade in the deposit.
- b) Calculate the Kriging error for the model accepted is represented in the below mention figure. Assume your own conditions.



(5+6)