REPUBLIC OF SOUTH AFRICA
DEPARTMENT OF MINERAL RESOURCES
EXAMINATION FOR THE MINE SURVEYOR'S CERTIFICATE OF COMPETENCY

DATE: 13 October 2011 TOTAL MARKS: 100
TIME: 12:30 – 15:30 (3 Hours) TO PASS: 50

MINING ECONOMICS II

NOTE:

1. Any pocket calculator may be used and intermediate results need not be shown. The make and model number of the calculator used must be noted on the front cover of the answer book.
2. Tables that may be used are attached hereto.
3. Graph, Probability and Log paper will be supplied if required
4. Your examination number must be written on all graph paper and loose sheets that are handed in with your examination script.

Question 1:

a) Explain what is meant by the following terms:

i)	Anisotropy	(2)
ii)	Cross Validation	(3)
iii)	Discretization	(2)
iv)	Range of influence	(3)
v)	Geostatistics	(3)
vi)	Kriging	(2)
vii)	Search Neighbourhood	(2)

b) Explain by means of annotated sketches the difference between a negatively and a positively skewed distribution as well as a normal distribution. Also indicate the positions of the mean, median and the mode on all three the distributions.

(6)

[23 Marks]

Question 2:

The following borehole values in (% MgO) were obtained by means of a sampling exercise carried out on a magnesite deposit.

11	16	12	27	31	14	23	24	23	25
31	21	24	25	24	17	21	34	26	22
21	20	25	22	23	26	27	29	24	36
35	18	19	23	26	33	18	37	13	29
34	30	26	31	28	26	28	22	32	33

a) Draw a histogram
b) Draw the frequency polygon and the frequency distribution from the histogram
c) Calculate the cumulative frequencies ("less than" and "more than")
d) Calculate the frequency percentages
e) Calculate the cumulative frequency percentages
f) Draw the "less than" and "more than" ogives
h) Comment on the frequency distribution obtained in (b)

[26 Marks]

Question 3:

The following table shows the sampling results of two variables. It is decided that only variable X will be sampled in future.

X	3.8	4.8	6.2	8.2	8.3	9.4	11.5	18.6	19.2
Y	5.8	4.7	8.4	9.2	9.6	10.1	11.2	14.2	17.8

a) The mean value for each variable
b) The standard deviations (for a sample and population) for each variable
c) The correlation coefficient
d) The regression line Y on X

[12 Marks]

Question 4:

The results from an underground sampling exercise carried out on a gold mine are as follows:

a) The ore body follows a two parameter lognormal pattern
b) Number of samples = 299
c) The standard deviation for a sample is 1 g/t
d) The mean of the ln(x) values is 2,9 g/t

Calculate:

a) The mean value of the ore body
b) The 95% upper and lower limit for the estimate

[15 Marks]

Question 5:

The drilling results from an opencast gold mining operation are as follows:

a) Number of samples = 27
b) The mean of the ln(x) values is 3,96 g/t
c) V=0.4391

Calculate:

a) The mean value of the ore body
b) The 95% upper and lower limit for the estimate

[15 Marks]

Question 6:

The management of ABC (Pty) Ltd is considering purchasing a milling machine for an amount of R92 000. The following cash flows may be generated over the next five years if the machine is utilized as planned:

Year 1	R20 000
Year 2	R25 000
Year 3	R29 000
Year 4	R30 000
Year 5	R 22 000

At the end of the five years the machine has a scrap value of R10 000. Assume a required rate of return of 16%. Would you advise management to buy this machine?

[9 Marks]

Total Marks [100]