UNIVERSITY OF MINES AND TECHNOLOGY, TARKWA

FIRST SEMESTER EXAMINATIONS, NOV/DEC 2018

COURSE NO: GM/MN 471
COURSE NAME: MINE PLANNING AND DESIGN
CLASS: GM/MN IV **TIME:** 3 HOURS

Name**:** _____Index Number: _____

Answer four (4) questions ONLY

1. (a) Why is it important to consider geomechanical data in underground mine planning and design? **(10 marks)**

   (b) Fig. 1 is a topography showing various contours in a mine. If this the area designated for siting the following infrastructures, indicate on it how it would be done:

   (i) Mine office;
   (ii) Tailings dam;
   (iii) Waste dump;
   (iv) Workshop; and
   (v) The mill

   (15 marks)

2. (a) Fig.2 is a 2-D model of a section of an open pit. Determine the maximum valued pit limit for the section using the 2-D Floating Cone algorithm for a maximum slope requirement of 1 block: 1 block. **(15 marks)**

	1	2	3	4	5	6	7	8	9
1	**-4**	**-4**	**-4**	**-4**	**-4**	**-4**	**-4**	**-4**	**-4**
2	**-11**	**-10**	**5**	**5**	**6**	**8**	**6**	**-10**	**-11**
3	**-16**	**-15**	**6**	**6**	**8**	**10**	**5**	**-15**	**-16**
4	**-19**	**-20**	**4**	**5**	**6**	**12**	**4**	**-20**	**-19**
5	**-24**	**-25**	**5**	**6**	**8**	**10**	**3**	**-25**	**-24**

Fig.2 2-D Model of a Section of an Open Pit

   (b) Discuss two major challenges of the floating cone optimization method. **(5 marks)**

   (c) What are the main constraints in the objective function of pit optimisation? **(5 marks)**

3. A slightly steeply dipping ore body has a width of 50 m, a strike length of 200 m & depth 1000 m. The density is 3.5 t/m3. It is suggested to mine this deposit at rate of 4.0 x 106 t/yr. It is estimated that the mining will require a capital investment of $100 million and variable operating cost of $25 million per 100 m ((50 + 0.25h) million dollars) where h is the depth of deposit worked). Interest rate is 20%. Ore mining recovery is expected to be 80%. Determine a suitable mine inter-level distance for exploiting the deposit. Iterate with inter-level distances of 100 m, 150 m or 200 m. **(25 marks)**

4. (a) Discuss the following mining systems:

   (i) Room and Pillar;

   (ii) Sublevel caving; and

   (iii) Cut and Fill **(25 marks)**

5. (a) Define the following:

   (i) Bench;

   (ii) Gangue;

   (iii) Orebody;

   (iv) Swell factor; and

   (v) Hanging wall **(5 marks)**

   (b) Discuss the distinction between surface and underground mining systems. **(10 marks)**

   (c) How is stripping ratio useful in mine planning and design? **(10 marks)**

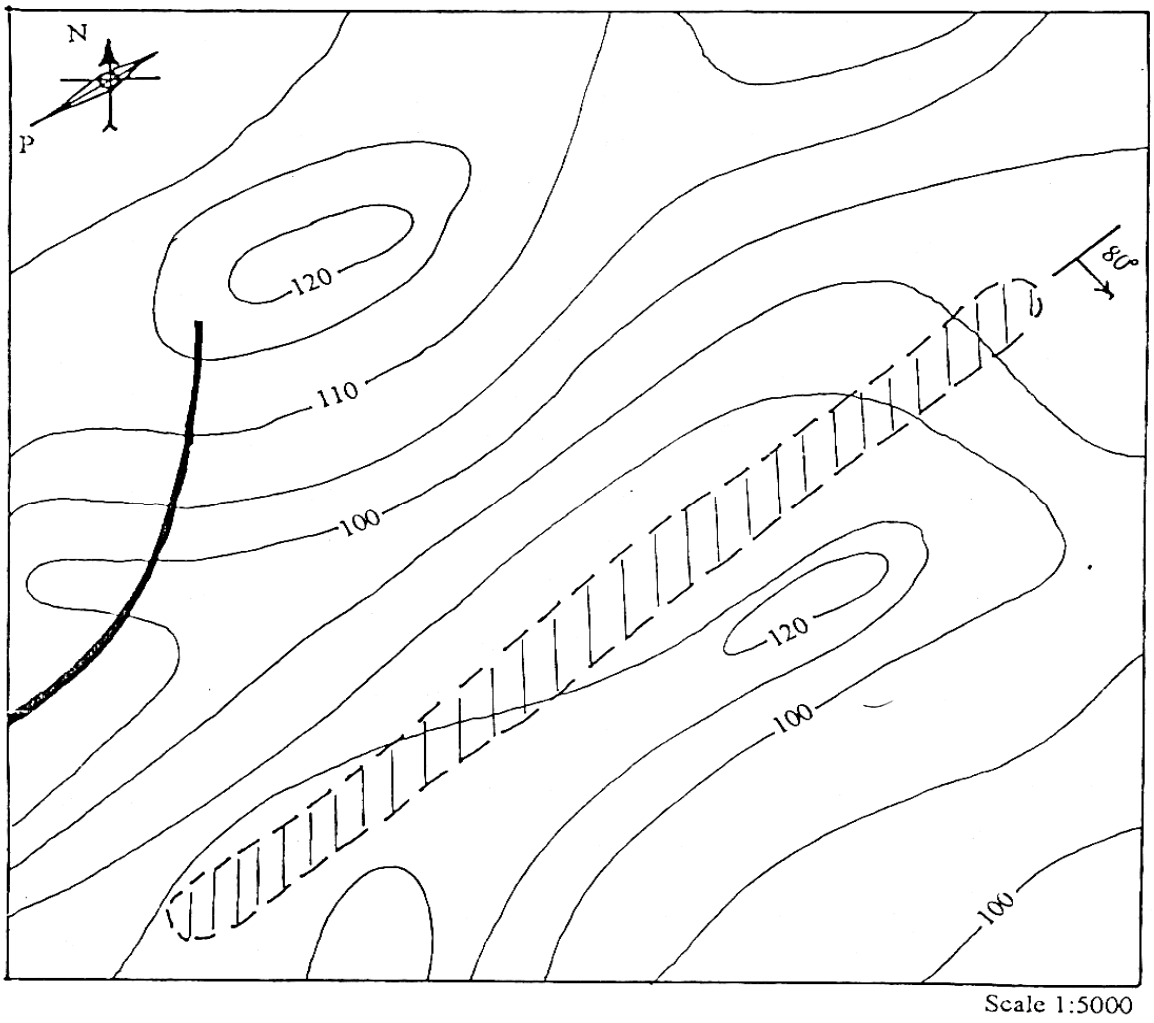

Fig.1 Topography Showing Various Contours of a Mine

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