UNIVERSITY OF MINES AND TECHNOLOGY, TARKWA

SECOND SEMESTER EXAMINATIONS. MAY

COURSE NO: MR/GL 164

COURSE NAME: **PRINCIPLES OF METALLURGICAL ENG.**

CLASS: **MR/GL** TIME: 3 HRS

Name**:** _____Index Number: _____

Answer all Questions

Question 1

(a) Explain briefly the following terms: ***(15 marks)***

(i)	Ore	(ii)	Deposit	(iii)	Grade of an ore
(iii)	Cut-off grade of an ore	(v)	Throw of a crusher	(vi)	Near mesh particles
(vii)	Work index of a material	(viii)	Terminal velocity	(ix)	Calcination
(x)	Dead roasting	(xi)	frother	(xii)	collector
(xiii)	Leaching roasting	(xiv)	Classification	(xv)	Chlorodising

(b) With diagrams, differentiate between the various types of jaw crushers ***(9 marks)***

(c) State 5 factors that affect the leaching of gold ores ***(5 marks)***

(ii) What is the importance of flux in smelting ***(2 marks)***

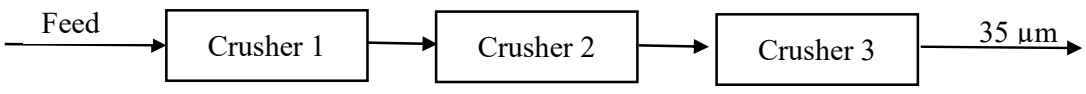
(d) Explain the importance of pH in gold cyanidation process ***(5 marks)***

Question 2

(a) Describe with the aid of a diagram, the mode of operation of the jigs and explain deferential acceleration, hindered settling and consolidation trickling ***(11 marks)***

(b) Distinguish between cataracting, cascading and centrifuging regime as applied in grinding. ***(9 marks)***

(c) A Quarry plant wishes to crush 500 tonnes of material per hour to produce a material of size 35 µm. After consultation, it was obvious that a three stage crushing (see fig below) would be required in order to achieve the targeted product size of 35 µm. Determine the feed size of the material entering crusher 1 if the reduction ratios for crusher 1, 2 and 3, respectively, are 4, 2.5 and 1.5. ***(4 marks)***



(d) If the feed to a mill was of size 80% passing 50 mm and the product size was 80% passing 75 µm.

i. Find the motor power required to grind 500 t/h if the work index is 12.0 kWh/t (assume power loss from pinion to motor as 2%) ***(8 marks)***

ii. If pits become deeper, rocks become harder and work index changes to 14.8 kWh/t, how many tonnes can be milled with the same motor power? ***(5 marks)***

Question 3

(a) Explain briefly the mechanism of particle breakage. ***(5 marks)***

(b) State 2 differences between the cone and gyratory crushers. ***(4 marks)***

(c) MR1 and GL1 students performed a screening test in the Minerals Engineering laboratory as part of Principles of Metallurgical Engineering taken in the second semester. The table below shows the data obtained from the test work.

i. Develop a screen analysis table showing the cumulative percentages passing and retained on the various screens. ***(11 marks)***

ii. Plot a graph of sieve size range against the cumulative percent passing and retained. ***(5 marks)***

iii. Determine the 80% and 50% passing screens. ***(4 marks)***

Particle size range, µm	Weight retained, g
-250+180	8.0
-180+125	11.0
-125+90	13.0
-90+63	14.5
-63+45	17.0
-45+0	26.5

Examiner: Dr Clement K. Owusu