



PROGRAM : NATIONAL DIPLOMA
EXTRACTION METALLURGY
SUBJECT : **COAL PROCESSING AND USAGE III**
CODE : **MCUA 311**
DATE : SUPPLEMENTARY EXAMINATION
01 DECEMBER 2014
TIME : SESSION 1 (11:30)
DURATION : 3 HOURS
WEIGHT : 40: 60
TOTAL MARKS : 123

EXAMINER : Mrs. N.TSHIONGO-MAKGWE
MODERATOR : Mr. G.M. CRESSWELL
NUMBER OF PAGES : 3 PAGES

INSTRUCTIONS : CALCULATORS ARE PERMITTED
ANSWER ALL QUESTIONS
REQUIREMENTS : 3 SHEETS OF GRAPH PAPER.

Question 1**[10]**

- 1.1 In which stage of coal processing is the dense medium drained from the washed coal? (2)
- 1.2 Explain the meaning of "the amount of remaining water is a function of particle size" (2)
- 1.3 What are the requirements for coking coal in relation to the moisture content after dewatering? (2)
- 1.4 What is the adequate moisture content after dewatering for
 - 1.4.1 Coarse coal (2)
 - 1.4.2 Small coal (2)

Question 2**[26]**

- 2.1 Draw a flow diagram of a level 4 coal washing plant. (10)
- 2.2 Give 3 reasons why coal is hard to sample (6)
- 2.3 How can you improve the precision level during coal sampling? (4)
- 2.4 List the four stages of coal formation. (4)
- 2.5 Explain the effect of pressure and temperature on the formation of coal and the contribution towards the rank of that coal. (2)

Question 3**[21]**

- 3.1 Briefly explain the dewatering process using centrifuge in coal processing. (5)
- 3.2 Why do we need to use centrifuge instead of dewatering screens for export coal. (2)
- 3.3 Briefly explain the compromise between the size and aperture when centrifuging fine coal. (4)
- 3.4 RSA coal is mostly used for power generation, but yet still has bigger exporting markets. Give the requirements for the two products and explain what might happen if ESKOM decides to use export grade for electricity generation. (10)

Question 4**[30]**

Answer this question using the washability data for a dense medium coal washer given on the table below;

Relative Density Range	Fractional Float Yield %	Fractional Float Ash %
Floats 1.30 –	3.1	6.47
1.30–1.40	7.5	8.2
1.40 – 1.50	37	13.03
1.50 – 1.60	29.9	20.04
1.60 – 1.70	10.8	29.78
1.170 – 1.80	3.2	36.53
Sinks 1.80	8.5	55.4

- 4.1 Complete the table and construct the following graphs; (15)
- 4.1.1 Densimetric curve
- 4.1.2 Cumulative float ash curve
- 4.1.3 Difficulty curve
- 4.2 Determine the float yield, Ash% sinks, near density and sinks yield at a density of 1.65 (8)
- 4.3 What is the meaning of the near density you obtained on the previous question? (2)
- 4.4 How much is the Organic efficiency if the plant achieves a yield of 40% with 12% ash content (5).

Question 5**[36]**

- 5.1 What are the three basic uses of RSA coals, also give the coal type suitable for each usage. (6)
- 5.2 Briefly explain the following methods;
- 5.2.1 Electricity generation using coal (10)
- 5.2.2 Coking process using coal (10)
- 5.2.3 Gasification process of coal (10)

TOTAL 123