

UNIVERSITY OF RUHUNA

BACHELOR OF SCIENCE SPECIAL DEGREE (LEVEL I)
SEMESTER 1 EXAMINATIONS JULY 2017

SUBJECT: Chemistry

COURSE UNIT: CHE 4142

TIME: Two (02) hours.

Answer **all** questions.

1. Answer **all** parts.

(a) Explain the following terms using relevant equations,

- (i) Coefficient of variance
- (ii) Gaussian (Normal) distribution
- (iii) Standard deviation

(15 marks)

(b) Distinguish between the two terms in each of the following;

- (i) Confidence interval and confidence limit
- (ii) Precision and accuracy
- (iii) Random errors and systematic errors
- (iv) Quantitative analysis and qualitative analysis

(30 marks)

(c) The following results were obtained for the determination of P (in ppm) in blood serum:

4.40, 4.42, 4.60, 4.48 and 4.50.

Determine whether the 4.60 ppm result is an outlier or should be retained at the 95 % confidence level. Now if some additional measurements were taken viz., 4.52, 4.55 and 4.57 now check the 4.60 ppm result is an outlier or should be retained at the 95 % confidence level.

(15 marks)

(d) A new procedure for determining trace amounts of Zn in a vegetable sample was evaluated and the following results were obtained.

0.083, 0.088, 0.087 and 0.086 ppm Zn.

The true value of the standard sample was found to be 0.082 ppm.

Is there a significant difference between the mean of results and the true value?

(20 marks)

- (e) Samples of a standard alloy were sent to two labs named as A and B. In lab A, the mean value of Ni for six determinations was found to be $(4.35 \pm 0.07) \%$. In lab B, the mean value for eight determinations of Ni. was found to be $(4.47 \pm 0.05) \%$. What is the pooled mean and pooled standard deviation for the two labs?

(20 marks)

[Statistical tables are provided].

2. Answer **all** parts.

- (a) List the qualities of an auditor under the following two categories;

- (i). Good qualities to possess to perform the tasks effectively.
 (ii). Bad qualities those adversely affect his work.

(20 marks)

- (b) Explain what is meant by “*fact finding auditing.*”

(25 marks)

- (c) Describe “a process” as indicated in the quality management system?

(10 marks)

- (d) Draw a simple model of “*a process-based continual improvement of the quality management system.*”

(25 marks)

- (e) In resource management process *to achieve the required quality of the produced goods* “human resource management plays a crucial role.” Comment.

(20 marks)

3. Answer **all** parts.

- (a) List all the essential elements of a quality management system.

(12 marks)

- (b) What are the main types of quality costs? Briefly explain.

(12 marks)

- (c) ABC is a company that manufactures rubber gloves. Every hour a sample of 125 finished gloves is drawn from the output and each glove is examined to check whether there are any defects. Those which fail are classified as defective; the rest are satisfactory. Given below are data on ten consecutive samples.

Sample no.	1	2	3	4	5	6	7	8	9	10
Defective	15	13	16	11	13	14	20	25	30	45

Draw a control chart and find out whether the system is under control.

(38 marks)

(d) A company that manufactures school bags found an increase in defects in their bags. They have collected the following data to find the major cause of the defects. Construct a Pareto chart to explain their findings.

Defect	Frequency
Damaged zip	28
Broken stiches	29
Irregular colour	7
Lose badges	14
Handles break easily	26
Ink smears	10
Mislabeled	8
Missing colour	9
Off colour	14
Oil spots	5

(38 marks)

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