



NCF-003-1102004

Seat No. _____

M. Sc. (Sem. II) (CBCS) (w.i.f. 2016) Examination

April / May – 2017

C-204 : Chemistry

(Analytical Chemistry)

[New Course]

Faculty Code : 003

Subject Code : 1102004

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

- Instructions :** (i) All questions are **compulsory**.
(ii) All questions carry equal marks.

1 Answer the following : (any **seven**) **14**

- (a) Write the reactions of ozone formation and depletion in stratosphere.
- (b) Define particles, ions and radicals in the atmosphere.
- (c) How will you analyse nitrate nitrogen in water sample ?
- (d) Explain green chemistry. Give its role in society.
- (e) Give the major sources of air and water pollution and their effects on living life.
- (f) Give the classification of air pollutants and water pollutants.
- (g) Define : Deviation, Confidence interval, accuracy and t-test.
- (h) Given the following set of weights 29.8, 30.2, 28.6 and 29.6 mg. Calculate the average deviation and average relative deviation.
- (i) Calculate the 50% and 95% confidence limits for the mean value 1.67 ppm Hg in a fish sample.
[For 50% confidence level $z=0.67$ and 95% confidence level $z=1.96$, $n=3$, $s \cong \sigma = 0.10$]
- (j) What is particulate matter ? How it emits ? Give the name of collection method.

2 Answer the following : (any **three**) **14**

- (a) Give the name of collection techniques of gaseous air pollutants from ambient air. How will you analyze nitrogen oxide and sulphur oxide in air sample ?
- (b) How will you analyze oxidants and ozone in air sample ?
- (c) How will you analyze water hardness and chloride in water sample ? Explain with chemical reactions.
- (d) What is alkalinity and acidity of water sample ? How will you detect them ? Differentiate hydroxide, carbonate and bicarbonate alkalinity.

3 Answer the following : **14**

- (a) Sulphate in natural water can be determined by measuring the turbidity that results when an excess of BaCl_2 is introduced into a measured quantity of the sample. The instrument was calibrated with a series of standard Na_2SO_4 solutions. The following data were obtained.

SO_4^{2-} , mg/lit X_i :	0.00	5.00	10.00	15.00	20.00
Turbidimeter Y_i reading :	0.06	1.48	2.28	3.98	4.61

Assuming a linear relationship between the instrument reading and concentration.

- (i) Fit the best straight line
 - (ii) Calculate the concentration of sulphate in a sample yielding a turbidimeter reading of 3.67.
- (b) An atomic absorption method for the determination of Fe in used jet engine oil was found from pooling 30 triplicate analysis to have a standard deviation $S \rightarrow \sigma = 2.4 \mu\text{g/ml}$. Calculate the 80 and 95% confidence interval for the result $18.5 \mu\text{g Fe/ml}$ if it was based upon.
- (i) single analysis (ii) a mean of two analysis (iii) the mean of four analysis.

[80% confidence limit $z=1.29$ and 95% confidence limit $z=1.96$]

OR

- 3 (a) Riboflavin is determined in a cereal sample by measuring its fluorescence intensity in 5% CH_3COOH solution. A calibration curve was prepared by measuring the fluorescence intensities of a standard of increasing concentrations. The following data were obtained. Use the method of least squares to obtain the best straight line for the calibration curve and to calculate the concentration of riboflavin in the sample solution. The sample fluorescence intensity was 15.4.

Riboflavin $\mu g / ml (X_i)$:	0.000	0.100	0.200	0.400	0.800
Fluorescence intensity in arbitrary units (Y_i):	0.0	5.8	12.2	22.3	43.3

- (b) You are developing a new colorimetric process for determining the glucose content of blood serum. You have chosen the Folin- W_u procedure with which to compare your results. From the following two sets of replicate analysis on the same sample determine whether the variance of your method differs significantly from that of the standard method. [$F_{tab} = 4.95$]

Your method mg / dl :	127	125	123	130	131	129	129
Folin- W_u method mg / dl :	130	128	131	129	127	125	

- 4 Answer the following : (any **two**) 14
- (a) What is oxygen demand ? How will you analyze COD ?
Write chemical reactions and procedure for its determination.
- (b) How will you determine sulphur and silica in soil sample ?
- (c) What is DO ? How will you determine it in water sample ?
Discuss with principle, reaction and procedure.

5 Answer the following : (any two) 14

- (a) Write the twelve principle of green chemistry and discuss any four in detail.
- (b) What are the alternate synthesis route of organic compounds ? Give their name and discuss the PTC with any three reaction of organic synthesis.
- (c) Explain the mechanical analysis of soil sample. How can the soil pollution be controlled ? Suggest effective measures to prevent soil pollution.
- (d) Analysis of chloride has established standard deviation (σ) of 0.041. Triplicate measurements with this method yielded an average value of 21.46% Cl for this determination. Calculate (i) the 80% confidence interval (ii) the 90% confidence interval and (iii) the 99% confidence interval.
[At 80% confidence interval $t=1.89$, at 90% confidence interval $t=2.92$ and at 99% confidence interval $t=9.92$]
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