



**DJJ-003-010204**

**M. Sc. (Sem. II) (Chemistry) (CBCS) Examination**

**April / May – 2015**

**C - 204 : Analytical Chemistry**

**Faculty Code : 003**

**Subject Code : 010204**

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

[Total Marks : 70

Instructions :

- (1) All questions are compulsory.
- (2) All questions carry equal marks.

1 Answer the following : (any seven)

- (a) Narrate importance of particulate matter.
- (b) Explain the term green chemistry and give its advantages.
- (c) Define (i) t-test (ii) F-test (iii)  $\chi^2$ -test
- (d) Calculate the average deviation and the average relative deviation of the following set of results 15.67, 15.69 and 16.03 g.
- (e) Define : Error, accuracy and precision
- (f) Explain hardness of water. Write the chemical reactions involved in its determination procedure.
- (g) Enlist the average micron size under which various particulates collection system works.
- (h) What is super critical fluid ? Briefly explain super critical CO<sub>2</sub> or H<sub>2</sub>O as green solvent.
- (i) What is significant figure ? express for following
  - (i) 0.00200
  - (ii) 99.9
  - (iii) 100.0
  - (iv) 0.317Calculate median for above figures.
- (j) How will you analyze Na and K in water sample ? How will you prepare 1000 ppm and 100 ppm of Na and K from NaCl and KCl.

- 2 Answer the following : (any three)
- Define COD. Give the chemical reactions involved in its measurement technique. Why  $\text{Ag}_2\text{SO}_4$  added in its measurement procedure ?
  - What is alkalinity and acidity of water sample ? Briefly explain its determination techniques and differentiate hydroxide, carbonate and bicarbonate alkalinity.
  - How will you analyze chloride, fluoride and sulphate in water sample ? Give the name of reagents used in their analysis and write the chemical reactions involved in its measurement.
  - How will you analyze ammonical, nitrate and nitrite nitrogen in water ? Give the principles and write the chemical reactions of its determination procedure.

3 Answer the following :

- Following data from a continuing study of calcium ion in the blood plasma of several individuals are obtained :

Subset	Mean Ca content mg/100 ml	No. of Obs.	Deviation of individual results from the mean value
1	3.16	5	0.14, 0.09, 0.06, 0.00, 0.11
2	4.08	4	0.07, 0.12, 0.10, 0.01
3	3.75	5	0.13, 0.05, 0.08, 0.14, 0.07
4	3.49	3	0.10, 0.13, 0.07
5	3.32	6	0.07, 0.10, 0.11, 0.03, 0.14, 0.05

- Calculate standard deviation for each set of values
  - Pool the data and calculate S for the analysis.
- (b) The following data were obtained in calibrating a colorimetry for the determination of trace amount of iron in aqueous solution.

Fe ppm( $X_i$ )	0.510	1.020	1.530	2.040	2.556	3.060	3.570	4.080	4.590	5.100
Colorimeter reading ( $Y_i$ )	8.2	15.1	18.0	23.7	32.1	36.4	45.0	49.6	56.1	61.2

- Fit the best straight line
- Calculate the concentration of solution that yielded reading of 9.9 and 43.7.

**OR**

- (b) Each of the following sets of data has what appears to be an outlying result. Apply the Q test (90% confidence) to determine whether this value should be retained or rejected.

A	B	C	D	E	F
75.47	14.64	31.42	31.42	9.22	9.22
76.36	14.41	31.40	31.40	9.06	9.06
76.04	14.46	31.04	31.04	9.20	9.20
76.13	14.44	-	31.44	-	9.24

No. of observations 3, 90% confidence  $Q_{\text{tab}} = 0.94$

No. of observations 4, 90% confidence  $Q_{\text{tab}} = 0.76$

- 4 Answer the following : (any two)
- (a) Describe the twelve principle of green chemistry in detail.
  - (b) Discuss the following reactions by conventional and green chemistry procedure. Give the green context in reactions.
    - (i) Preparation of acetanilide
    - (ii) Bromination of trans-stilbene
  - (c) Define ionic liquid. Give their name and preparation of any one ionic liquid. Mention any one chemical reaction using ionic liquid. Also briefly explain electrochemistry used in green synthesis.
- 5 Answer the following : (any two)
- (a) Describe chemistry of photochemical smog with relevant equation.
  - (b) Discuss earth atmospheric system energy balance with diagram and its importance.
  - (c) Give the detailed practical procedure for DO and BOD determination.
  - (d) (i) Define : Mean, median, deviation  
(ii) Analysis of a sample of iron gave the following % value for the iron content :  
7.08, 7.21, 7.12, 7.09, 7.16, 7.14, 7.07, 7.14, 7.18 and 7.11.  
Calculate the mean, standard deviation and coefficient of variance.