



**MCC-003-1102004-N**

Seat No. \_\_\_\_\_

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

**April / May - 2018**

**C-204 : Chemistry**  
*(Analytical Chemistry)*  
*(New Course)*

**Faculty Code : 003**

**Subject Code : 1102004**

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) 14**

- (a) Define air pollution and give the major sources of it.
- (b) How will you analyze acidity of water sample ?
- (c) How will you analyze potassium in soil sample by flame photometry ?
- (d) What is particulates ? Give the classification of it.
- (e) Define green chemistry. Why do we need green chemistry ?
- (f) Give the conventional and alternate green procedure for preparation of 1,1-bis-2-naphthol with green context.
- (g) Define : Accuracy, deviation, confidence limit and coefficient of variance.
- (h) The percentages of a constituent A in a compound AB were found to be 48.32, 48.36, 48.23, 48.11 and 48.38%. Calculate the mean, mean deviation and the relative mean deviation.
- (i) Calculate the 50% and 95% confidence limits for the mean value 1.67 ppm Hg in a fish sample [ $n = 3$ ,  $s \cong \sigma = 0.10$ , 50% confidence level  $z = 0.67$  and 95% confidence level  $z = 1.96$ )

- (j) The analysis of calcite sample yielded CaO% of 55.95, 56.00, 56.04, 56.08 and 56.23 respectively. The last value appears anomalous; should it be retained or rejected ? ( $Q_{\text{tab}} = 0.64$ )

2 Answer the following : (any three) 14

- (a) Give the principle of green chemistry and discuss any three of them in detail.
- (b) What is PTC ? Discuss any two synthesis using PTC with reaction mechanism.
- (c) Discuss photochemical reactions in detail.
- (d) How will you determine total sulphur in soil sample ?

3 Answer the following : 14

- (a) Calibration data for a chromatographic method for the determination of isooctane in a hydrocarbon mixture are
- Mole %

|                  |       |       |      |      |      |
|------------------|-------|-------|------|------|------|
| Isooctane, $X_i$ | 0.352 | 0.803 | 1.08 | 1.38 | 1.75 |
| Peak area, $Y_i$ | 1.09  | 1.78  | 2.60 | 3.03 | 4.01 |

Fit the best straight line.

- (b) How will you determine lime and liming material in soil sample ?

**OR**

- (a) The following are polarographic diffusion currents for standard solutions of methyl vinyl ketone (MVK)

|                                   |       |      |       |       |       |      |
|-----------------------------------|-------|------|-------|-------|-------|------|
| Conc. of MVK<br>m mol/lit., $x_i$ | 0.500 | 1.50 | 2.50  | 3.50  | 4.50  | 5.50 |
| Current, $\mu\text{A}$ , $y_i$    | 3.76  | 9.16 | 15.03 | 20.42 | 25.33 | 31.9 |

- (i) Fit the best straight line
- (ii) Two samples containing MVK yielded currents of 6.3 and 27.5  $\mu\text{A}$ . Calculate the concentration of MVK in each solution.
- (b) Give principle, reactions and procedure for determination of COD.

- 4 Answer the following : (any two) 14
- (a) How will you determine hardness of water sample ? Give chemical reactions and procedure for it.
- (b) Write note on collection of particulate pollutants.,
- (c) How will you analyze ozone and ammonia in air sample ?

- 5 Answer the following : (any two) 14
- (a) A new gravimetric method is developed for Fe(III) in which the iron is precipitated in crystalline form with an organo boron "cage" compound. The accuracy of the method is checked by analyzing the iron in an ore sample and comparing with the results using the standard precipitation with  $\text{NH}_3$  and weighing as  $\text{Fe}_2\text{O}_3$ . The results reported as % Fe for each analysis.

| Test Method<br>% | Ref. Method<br>% |
|------------------|------------------|
| 20.10            | 18.89            |
| 20.50            | 19.20            |
| 18.65            | 19.00            |
| 19.25            | 19.70            |
| 19.40            | 19.40            |
| 19.99            |                  |

Is there significant difference between the two methods ?  
( $t = 2.26$  and  $F_{\text{tab}} = 6.26$ )

- (b) Each of the following sets of data appears to be an outlying result. Apply the Q test (90% confidence) to determine whether this value should be retained or rejected. (For 4 measurement  $Q_{\text{tab}} = 0.76$  and 3 measurement  $Q_{\text{tab}} = 0.94$ )

| A     | B     | C     | D     | E    | F    |
|-------|-------|-------|-------|------|------|
| 75.97 | 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 |

- (c) 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 Obsns. | Deviation of individual result 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                 |

- (i) Calculate  $S$  for each set of values
- (ii) Pool the data and calculate  $S$  for the analysis.
- (d) Give the principle, reactions and procedure for determination of dissolved oxygen.
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