**Total No. of Questions : 9]**

**P1398**

SEAT No. :

[Total No. of Pages : 3

**[5123]-317**

**M.Sc.-II**

**ANALYTICAL CHEMISTRY**

**CHA-380: I- Analytical Method Development and Validation**

**II- Geochemical and Alloy Analysis**

**III- Laboratory Automation and Sensor Based Techniques**

**(2013 Pattern) (Credit System) (Semester-III)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

*1) Answers to the two sections should be written in separate answer books.*

*2) All questions are compulsory.*

*3) Neat diagrams must be drawn wherever necessary.*

*4) Use of logarithmic table, non programmable calculator is allowed.*

## SECTION-I

**Q1)** Answer the following: [10]

a) Define: Absolute error and Gross error.

b) How to estimate reliability of result.

c) Explain standard deviation.

d) What is method modification and revalidation?

e) Give five topics which are selected for Initial Harmonization.

**Q2)** Attempt <u>any two</u> of the following: [10]

a) Enlist essential principle of method transfer. Explain any two of them.

b) Describe inter-laboratory qualification process.

c) Explain the term: Specificity and selectivity.

d) Consider following set of data:

| Set A | | Set B | | Set C | |
|---|---|---|---|---|---|
| True value | obs. value | True value | obs value | True value | obs value |
| 611.6 | 614.00 | 0.07173 | 0.0716 | 38.803 | 38.85 |

Find absolute error in the measurement.

*P.T.O.*

*Q3)* Attempt <u>any one</u> of the following: **[5]**

    a)    Explain United State Pharmacopia and national formulary.

    b)    If fluorescence intensity of test solution containing quinine was 16.10. The following values have been determined:

$$\sum x_1 = 1.00 \quad \sum y_1 = 49.5, \quad \sum x_i^2 = 0.30$$

$$\sum x_i^2 = 1.000 \quad \sum x_1 y_1 = 14.73$$

The number of points (n=5), Calculate independent variable (x in μg/ml) by linear regression method.

## SECTION-II
### (Geochemical and Alloy Analysis)

*Q4)* Answer the following: **[10]**
    a)    How organic carbon of soil is determined?
    b)    What is composition of solder and steel alloy?
    c)    Give the principle for estimation of copper from bronze alloy.
    d)    What is sampling? Give the method for sampling of soil.
    e)    Enlist any two ores of iron. Give their minor constituents.

*Q5)* Attempt <u>any two</u> of the following: **[10]**
    a)    Discuss in brief procedure for estimation of total potassium from soil.
    b)    Give the procedure for estimation of calcium and magnesium from dolomite ore.
    c)    Outline the method for determination of chromium from steel.
    d)    0.310g of organic compound analyzed for its Nitrogen content by Kjeldahl's method. The evolved ammonia was absorbed in 50ml of 0.11 N Hcl. The remaining Hcl was back tirated with 0.11 N NaoH gives burette reading of 21.2 ml. Calculate the percentage of Nitrogen in given sample.

*Q6)* Attempt <u>any one</u> of the following: **[5]**
    a)    Write a note on cation exchange capacity of soil.
    b)    2.6 gm of Bronze alloy was dissolved in 5 ml conc.$HNO_3$ and diluted to 250 ml. A 50 ml aliquote of this solution is mixed with 20 ml of 1% benzoic oxine solution to precipitat copper as copper-oxine complex. The resultant complex on drying and heating give precipitate of cuo,which is found to weigh 0.423 gm. Calculate the percentage of copper in given sample.
        [Given At. Wt Cu= 63.54g 0=16g]

**[5123]-317**         2

## SECTION-III

### (Laboratory Automation and Sensor Based Techniques)

*Q7)* Answer the following:                                         **[10]**

    a)    What is flow injection Analyzer?

    b)    State any four achievements of bio transduction.

    c)    What is microfabrication?

    d)    Enlist different types of analyzers.

    e)    What is automatic titrations?

*Q8)* Attempt <u>any two</u> of the following:                      **[10]**

    a)    Explain serial and parallel integration.

    b)    Discuss in detail chemical sensors.

    c)    Explain continuous flow analyzer.

    d)    Write a note on cylindrical robot.

*Q9)* Attempt <u>any one</u> of the following:                      **[5]**

    a)    Explain surface acoustic wave sensor.

    b)    Write a note on piezoelectric quartz crystal resonator.

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