



B.Sc. (Semester – V) Examination, October/November 2016
CHEMISTRY (Paper – IV) (6 Units)
Analytical Chemistry

Duration : 2 Hours

Total Marks : 80

- Instructions :** 1) Answer to the **two** Sections should be written on **separate** answer books.
2) Figures to the **right** indicate **full** marks.
3) **Use** of non-programmable calculator is **allowed**.
4) Log tables will be supplied on **request**.
5) **All** questions are compulsory, however internal choice is **available**.

SECTION – I

1. Answer **any four** of the following : (4×4=16)
- I) How analytical chemistry is important w.r.t. air pollution control ?
 - II) When the method of coning and quartering is used in sampling of solids ?
 - III) Explain the significance of 'true value' in analytical chemistry.
 - IV) When the least count of burette is 0.1 mL, then can the burette reading be reported as 15.22 mL ? Why ?
 - V) Differentiate between F-test and null hypothesis.
 - VI) What is the basic principle of solvent extraction ?
2. A) I) What is the function of output transducers or read out devices used in instruments. Give two examples. 3
- II) Express the results of the following calculations using significant figures only : 3
- i) $3.04 + 5.4 + 0.4244$
 - ii) $\frac{2.52 \times 4.10 \times 15.04}{6.15 \times 10^4}$
 - iii) $\frac{4.5 \times 22.14 \times 6.10}{0.001120}$

OR

P.T.O.



- A) I) Why standard deviation is accepted universally as a parameter of precision. 2
 II) Two different spectrometric methods were used to estimate Cd in an alloy. The results obtained in ppm units are as follows : 4

Method I	Method II
0.500	0.488
0.500	0.488
0.500	0.480
0.450	0.420
0.500	0.454

Are two means significantly different ? (given $s = 0.01$ and $t_{\text{tab}} = 2.31$ at 95% probability level).

- B) I) Which are the basic components involved in instruments for analysis ? 3
 II) Is it possible to eliminate gross error from the analysis ? Why ? 3
 3. A) I) How sampling is carried out for homogeneous liquids ? 3
 II) In the gravimetric analysis of metal, the following values are obtained.
 240, 243, 240, 246, 250.
 Determine by applying 'Q' test, which value requires rejection and which value requires retention.
 [$Q_{\text{tab}} = 0.64$ for $n = 5$ at 90% probability level). 3

OR

- A) I) Derive an equation for the amount of substance remaining unextracted in aqueous phase after 'n' extractions. 4
 II) Explain personal error or human error with example. 2
 B) I) Explain how the method of averages is applied to obtain an equation for best fitting straight line when the equation is $y = mx$. 4
 II) How sampling of flowing liquids is carried out ? 2

SECTION - II

4. Answer the following questions (Any four) : (4×4=16)
 i) What is coulometer ? Describe any one coulometer.
 ii) Why is it necessary to remove dissolved oxygen from the experimental solution before electrolysis in polarography ?



- iii) Discuss the potentiometric titrations with respect to acid base titrations and precipitation titrations.
- iv) Discuss the principle of Flame photometry.
- v) Give the limitations of atomic absorption spectroscopy.
- vi) With suitable examples, illustrate the different types of titration curves obtained in amperometric titration.
5. A) i) Explain the terms :
- a) Residual current
- b) Diffusion current. 4
- ii) Enumerate the advantages of atomic absorption spectroscopy over flame photometry. 2
- OR
- A) iii) Discuss the applications of coulometric titrations in the acid base titrations and complex formation titrations. 4
- iv) What is an Inducted Coupled Plasma ? 2
- B) i) Discuss the principles of potentiometric titrations. 4
- ii) What are the advantages of amperometric titrations ? 2
6. A) i) How does the copper is determined by constant current electrolysis ? 4
- ii) What is indicator electrode ? 2
- OR
- A) iii) What is electrogravimetric analysis ? State the Faraday's laws of electrolysis. 4
- iv) Explain the method of circle fitting location of equivalence point from the graph of E v/s V in potentiometric titration. 2
- B) i) Discuss the applications of Flame photometry. 4
- ii) With a neat labeled diagram explain the construction of rotating platinum electrode. 2
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