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(4th Semester)

CHEMISTRY

FOURTH PAPER (CHEM-241)

(Analytical Chemistry—I)

Full Marks : 55

Time : 2½ hours

(PART : B—DESCRIPTIVE)

(Marks : 35)

*The figures in the margin indicate full marks
for the questions*

1. (a) What is accuracy? What are the different ways of expressing accuracy? 3
- (b) Write a short note on 'reporting of analytical data'. 2

- (c) Evaluate the following expressions rounding off the answer to the appropriate number of significant figures : 2

(i) 42 71 g 9 643 g 8 0 g

(ii) 0 165 cm³ 10 487 cm³

OR

2. (a) What do you mean by a test of significance? Discuss taking the example of *t*-test. 1+3=4
- (b) What are determinate and indeterminate errors? Describe one method to minimize determinate errors. 2+1=3
3. (a) Define the following terms : 1+1=2
- (i) Indicators
- (ii) Endpoints
- (b) Why KMnO₄ cannot be used as primary standard and I₂ can be used as secondary standards? 3
- (c) What are redox titrations? Give example. 2

(3)

OR

4. (a) Write the theory of acid-base indicators. Give an example. 3
- (b) Calculate the molarity and normality of a solution containing 63 g of oxalic acid ($C_2H_2O_4 \cdot 2H_2O$; m. wt = 126) dissolved in 1000 mL of solution. 3
- (c) Define the term 'titrant'. 1
5. (a) Write a note on fractional precipitation. 3
- (b) How would you separate calcium and barium ions present in the mixture? 4
- OR
6. (a) Write the advantages of organic reagents over inorganic reagents. 3
- (b) Give the structure of (i) dimethylglyoxime and (ii) oxine, and explain their applications in inorganic analysis. 2+2=4
7. (a) What is an electrolyte? Differentiate between weak and strong electrolytes. 1+2=3
- (b) What is the basis of group separation in inorganic salt analysis? 2

(4)

- (c) Discuss the use of common ion effect in salt analysis. 2

OR

8. (a) What is buffer capacity? Why is ammonium acetate (CH_3COONH_4) a buffer but not NaCl? 1+3=4
- (b) Derive the relationship between ionic product of water (K_w), dissociation constant of weak acid (K_a) and hydrolysis constant (K_h) of hydrolysis of salt of weak acid and strong base. 3
9. (a) What are ion-selective electrodes? Why is it superior to other methods of analysis? 1+2=3
- (b) Write a note on electro-osmosis. 3
- (c) Mention two uses of isotope labelling. 1
- OR
10. (a) Describe the principle of Geiger-Muller counter for detection and measurement of radioactivity. 3
- (b) Write a note on radiometric titration. 4

Subject Code : CHEM/IV/04

Booklet No. **A**

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Date Stamp

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To be filled in by the Candidate

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DEGREE 4th Semester
(Arts / Science / Commerce /
.....) Exam., **2016**
Subject
Paper

To be filled in by the Candidate
DEGREE 4th Semester
(Arts / Science / Commerce /
.....) Exam., **2016**
Roll No.
Regn. No.
Subject
Paper
Descriptive Type
Booklet No. B

INSTRUCTIONS TO CANDIDATES

- 1. The Booklet No. of this script should be quoted in the answer script meant for descriptive type questions and vice versa.
- 2. This paper should be ANSWERED FIRST and submitted within 45 minutes of the commencement of the Examination.
- 3. While answering the questions of this booklet, any cutting, erasing, overwriting or furnishing more than one answer is prohibited. Any rough work, if required, should be done only on the main Answer Book. Instructions given in each question should be followed for answering that question only.

Signature of
Scrutiniser(s)

Signature of
Examiner(s)

Signature of
Invigilator(s)

CHEM/IV/04

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(4th Semester)

CHEMISTRY

FOURTH PAPER (CHEM-241)

(Analytical Chemistry—I)

(PART : A—OBJECTIVE)

(Marks : 20)

The figures in the margin indicate full marks for the questions

SECTION—A

(Marks : 5)

Put a Tick (✓) mark against the correct answer in the brackets provided : 1×5=5

1. How many significant figures are there in
2 050 10⁵?

(a) 3 ()

(b) 4 ()

(c) 5 ()

(d) 6 ()

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(2)

2. Which among the following is not an acid-base indicator?

(a) Methyl orange ()

(b) Phenolphthalein ()

(c) Methylene blue ()

(d) Methyl red ()

3. Which one of the following compounds forms a yellow-greenish precipitate with acetic acid solution of Cu^{2+} ion?

(a) Salicylaldoxime ()

(b) Alizarin-S ()

(c) Cupferron ()

(d) Oxine ()

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(3)

4. What is the pH of 0.001 M HCl solution?

(a) 1 ()

(b) 3 ()

(c) 5 ()

(d) 4 ()

5. The instrument used for evaluating and characterising optically active compounds is

(a) potentiometer ()

(b) polarimeter ()

(c) colorimeter ()

(d) optometer ()

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(4)

SECTION—B

(Marks : 15)

Each question carries 3 marks

1. What is meant by the term 'confidence limit'? Write its significance.

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(5)

2. What are primary and secondary standards? Give example of each.

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(6)

3. What are the differences between post-precipitation and co-precipitation?

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(7)

4. Write a note on ionic product of water.

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(8)

5. Write a note on electrochemical sensors.

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