P. P. SAVANI UNIVERSITY

Fifth Semester of B.Sc. Examination
December-2021
SSCH3150–Physical Chemistry VIII

13.12.2021, Monday **Time: 12:30 p.m. to 03:00 p.m.** **Maximum Marks: 60**

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

Section-I (Total Marks - 30)

Q.1 Short Questions **[10]**

1.1 Objectives **[05]**

1.1a

A.

B.

C.

What is correct about A in the given picture?

- **A** Both Accurate and Precise
- **B** Precise but not accurate
- **C** Neither precise nor accurate
- **D** All of the above

1.1b Indeterminate errors are also called

- **A** random errors
- **B** personal errors
- **C** methodic errors
- **D** psychological errors

1.1c If $Q_{calc.} < Q_{tab}$, then the suspected value is

- **A** accepted
- **B** rejected
- **C** Both accepted and rejected
- **D** None

1.1d The number of significant figures in 11.2280 is

- **A** 4
- **B** 5
- **C** 6
- **D** 7

1.1e _____is defined as the reproducibility of measurements.

- **A** Precision
- **B** Accuracy
- **C** Both precision and accuracy

D None

1.1f Systematic errors occur due to
- A Overuse of instruments
- B Careless usage of instruments
- C Both
- D None

1.1g Poor precision in in scientific instrument may arise from
- A The standard being too strict
- B Human error
- C Limitations of measuring instrument
- D Both human error and limitations of measuring instrument

1.1h The t-test is used to test the null hypothesis that two _____ do not differ significantly.
- A Means
- B Median
- C Mode
- D None

1.1i 4× a.d. is
- A 3 ad rule
- B 4 ad rule
- C 4d rule
- D 3d rule

1.1j z > 4d, then the doubtful value is
- A Accepted
- B Rejected
- C Undefined
- D None of the above

1.2 Answer the Following: (MCQ/Short Question/Fill in the Blanks) **[05]**

1.2a What is constant error?

1.2b Random error is a type of _____ error. (Determinate/ Indeterminate)

1.2c Define deviation.

1.2d How many significant figures are there in the following number: 0.062005?

1.2e Define: Precision.

Q.2 Short Notes (Attempt any two) **[06]**

A Write a note on Student's test.

B Explain the difference between Accuracy and Precision.

C Apply Q-test to check the rejection of the highest value in the following results: 2.18, 2.19, 2.30, 2.15 and 2.20

Values of Rejection Quotient Q at 90% confidence level

No. of Observations	Q
3	0.94
4	0.76

5	0.64
6	0.56
7	0.51

Q.3 Explain in detail (Attempt any two) [14]

A What is error? Define and explain the types of errors?

B Consider the following set of replicate measurements of an analyte: 0.792, 0.794, 0.813 and 0.900 g. The true value is 0.830 g. Calculate (a) mean (b) median (c) range (d) standard deviation (e) coefficient of variation (f) absolute error of the mean. Consider no observation is rejected.

C Explain 4d rule and Q test.

Section-II (Total Marks - 30)

Q.1 Short Questions

1.1 Objectives [10]

1.1a The degree of hydrolysis of ammonium acetate [05]

A depends upon its concentration
B does not depend upon its concentration
C directly proportional to the square of its concentration
D does not depend upon temperature

1.1b Which one of the following will not be hydrolysed?

A KNO_3
B K_2CO_3
C KCN
D CH_3COOK

1.1c The hydrolysis constant K_h of a weak base and a strong acid is _____ to the dissociation constant K_b, of the base

A directly proportional
B inversely proportional
C equal
D not equal

1.1d When a salt of strong acid and weak base is dissolved in water _____ occurs to give _____ solution

A ionisation, basic
B ionisation, acidic
C hydrolysis, acidic
D hydrolysis, basic

1.1e Insulating materials are also termed as

A dimagnetics
B dielectrics
C Both
D None

1.1f What is correct for a capacitor?

A It has alternating layers of dielectric and conductor
B It is capable of storing charge
C It can be a single layer or multi-layer device

D All of the above

1.1g The ability of a material to polarize and store a charge within it is called
- A Dipole
- B Capacitor
- C Permittivity
- D None of the above

1.1h Iron is an example of _____ type of materials.
- A Paramagnetic
- B Dimagnetic
- C Ferromagnetic
- D None of the above

1.1i The reaction of an anion or cation with water accompanied by cleavage of O–H bond is called
- A neutralization
- B hydrolysis
- C acidification
- D Ionization

1.1j When a pinch of NaCN is added to pure water, the pH
- A increases
- B decreases
- C remains the same
- D none of these

1.2 Answer the Following: (MCQ/Short Question/Fill in the Blanks) **[05]**

1.2a Define: Cationic Hydrolysis.

1.2b What are active dielectrics?

1.2c Define: Hydrolysis constant

1.2d What is electric flux density?

1.2e Dielectrics are _____ materials. (non-metallic/metallic)

Q.2 Short Notes (Attempt any two) **[06]**

A Calculate the hydrolysis constant and pH of 0.625 M solution of CH_3COONa. Ka = 1.754×10^{-5}.

B Derive the relation between Hydrolysis constant and Degree of hydrolysis for a salt of strong acid-weak base.

C Discuss the types of Polarization.

Q.3 Explain in detail (Attempt any two) **[14]**

A Derive Claussius-Mosotti equation.

B Give the classification and discuss the properties for diamagnetic, paramagnetic and ferromagnetic materials.

C Discuss the Bronsted-Lowry concept of hydrolysis.