

2125

Bachelor of Science (FYUP) First Semester
Industrial Chemistry

Paper: Basic Industrial Principle, Data Analysis, and Laboratory Operations (ICHDSC)

Time allowed: 3 Hours

Max. Marks: 67

NOTE: Attempt four questions in all, including Question No. 1 which is compulsory and selecting one question from each Unit. Use of a Scientific Calculator is not allowed.

x-x-x

I. A) Multiple choice questions:-

- (i) Which of the following is NOT a fundamental quantity?
A. Mass
B. Length
C. Time
D. Velocity
- (ii) Which concentration term changes with temperature?
A. Molality
B. Mole fraction
C. Molarity
D. Mass %
- (iii) The difference between the true value and the measured value is called:
A. Gross error
B. Relative error
C. Absolute error
D. Random error
- (iv) If 2 moles of NaCl are dissolved in 1 L of solution, the molarity is:
A. 0.5 M
B. 1 M
C. 2 M
D. 4 M
- (v) A secondary standard solution must be:
A. Prepared directly by weighing
B. Standardized using a primary standard
C. Always acidic
D. Never used in titrations
- (vi) Which software is most commonly used for chemical structure drawing?
A. Origin
B. ChemDraw
C. MATLAB
D. AutoCAD
- (vii) pH meter works on the principle of:
A. Beer-Lambert law
B. Conductometry
C. Potentiometry
D. Colorimetry
- (viii) The glass electrode responds to the concentration of:
A. Na⁺ ions
B. H⁺ ions
C. OH⁻ ions
D. K⁺ ions
- (ix) When diluting acids, the correct procedure is:
A. Add water to the acid
B. Add acid to water
C. Add both simultaneously
D. It doesn't matter. (9x1)

B) Short Answer Questions

- (i) Differentiate between Accuracy and precision.
- (ii) What is normality, and how is it different from molarity? Discuss by taking the example of 0.1 M H₂SO₄?
- (iii) Give the factors that affect the concentration of the solution.

(2)

(iv) What do you understand by the terms homogeneous and heterogeneous solution?

(v) Draw the detailed diagram of the Glass electrode. (5x2)

UNIT - I

- II. a) Define Dimensional Homogeneity and Dimensional analysis by taking a suitable example.
- b) What do you understand by the term Solution? How can its concentration be expressed?
- c) What is an Error, and what are its types? Explain in detail. (4,6,6)
- III. a) Discuss in detail the applications and limitations of Dimensional equations.
- b) Calculate the Normality, Molarity, Molality, and mass percentage of the solution provided, 2g Ca(OH)₂ dissolved in 1 L of water. (Mw. of Ca, O, H is 40, 16, 1, respectively).
- c) How errors can be determined in the experiment and can be eliminated. (4,6,6)

UNIT - II

- IV. a) Explain in detail what Buffers are, their types, and their importance in Industrial chemistry.
- b) What do you understand by limiting reactants and excess reactants in a reaction?
- c) Explain using a graph how the activation energy is calculated with the aid of the Arrhenius equation. (5,6,5)
- V. a) Explain in detail the ChemDraw and ChemSketch software in Chemistry.
- b) What are the factors that affect the concentration of gas in solutions?
- c) Explain in detail primary as well as secondary standards. (6,5,5)

UNIT - III

- VI. Explain in detail:-
- a) Calibration
- b) Factors affecting pH measurement
- c) Handling of Hazardous Materials
- d) Desiccator (4x4)
- VII. a) Write a note on the safety handling and disposal of chemical wastes.
- b) Discuss in detail the principle of pH measurement.
- c) What are maintenance guidelines? Explain briefly. (6,6,4)