Exam.Code:0001
Sub. Code: 17051

2125

B.A./B.Sc. (General) First Semester

Chemistry

Paper -III: Physical Chemistry – A

(Same for B.Sc. Microbial and Food Technology)

Time allowed: 3 Hours Max. Marks: 22

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting one question from each Unit.

x-x-x

1. Attempt the following:-

   (a) Define precision and accuracy.

   (b) Define critical temperature.

   (c) Write the relation between rate constant and half-life for a first-order reaction.

   (d) What is activation energy?

   (e) What is meant by mean free path?

   (f) Write one example each of homogeneous and enzyme catalysis. (6x1)

UNIT - I

2. (a) Define mean, median, and standard deviation.

   (b) Discuss how accuracy in chemical analysis can be improved. (2x2)

3. (a) Find the first derivative and point of maxima/minima for the function:

   $y = x^3 - 3x^2 + 2$

   (b) Explain the principle of least squares method for data fitting. (2x2)

UNIT - II

4. (a) Derive the Van der Waal's equation of state and explain the significance of its constants.

   (b) Discuss the deviation of real gases from ideal behaviour with the help of PV– isotherms. (2x2)

5. (a) Derive the relationship between critical constants and Van der Waal's constants.

   (b) Explain the process of liquefaction of gases on the basis of Joule–Thomson effect. (2x2)

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UNIT - III

6. (a) Explain the factors influencing the rate of a chemical reaction.

   (b) Derive the integrated rate equation for a first-order reaction. (2x2)

7. (a) Describe any two methods for determining the order of a reaction.

   (b) Explain how radioactive decay follows first-order kinetics with suitable mathematical expression. (2x2)

UNIT - IV

8. (a) Explain the Arrhenius equation and discuss the significance of activation energy.

   (b) Derive the rate constant expression based on Transition State Theory. (2x2)

9. (a) Discuss the Michaelis–Menten mechanism of enzyme catalysis and derive the rate equation.

   (b) Differentiate between acid-base and enzyme catalysis with example. (2x2)

x-x-x