(i) Printed Pages: 3 Roll No. .....

(ii) Questions : 9 Sub. Code : 0 0 5 1

Exam. Code : 0 0 0 1

B.A./B.Sc. (General) 1st Semester

(2122)

CHEMISTRY

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

Paper-III : Physical Chemistry-A

Time Allowed : Three Hours] **[Maximum Marks : 22**

Note :— (1) Attempt **FIVE** questions in all, including Question No. **9** (Section-E) which is compulsory and selecting **ONE** question each from Sections A-D.

(2) Use of log tables and simple calculator is allowed.

SECTION—A

1. (a) Integrate $\int \sin 2x \sin 4x dx$. 2

(b) Find the derivative of $\cos(x^2+2)$. 2

2. (a) The concentrations of oxalic acid in mg/litre in an analysis were found as follows : 35, 33, 31, 26, 25, 27, 23, 24. Calculate mean and standard deviation for these values. 2

(b) Explain least square method for curve fitting with example. 2

SECTION—B

3. (a) Define mean free path and collision diameter. Derive the relationship between them. Show how mean free path depends upon the temperature. 2

   (b) At what temperature root mean square velocity of nitrogen becomes double of its value at STP ? 2

4. (a) How does Van der Waals equation explain the behaviour of real gases under different conditions of temperature and pressure ? 2

   (b) Derive the expression $P_c V_c = \frac{3}{8} RT_c$, all symbols have their usual meaning. 2

SECTION—C

5. (a) Write expression for the rate constant for a reaction of second order of type 2A $\rightarrow$products. What are the units of the rate constant ? 2

   (b) Briefly describe Van't Hoff Differential method for determination of order of reaction. 2

6. (a) How does the temperature affect the rate of reaction ? Explain clearly. 2

   (b) How can you prove kinetically that hydrolysis of ethyl acetate is a uni-molecular reaction ? 2

SECTION—D

7. (a) Explain the effect of temperature on the rate of reaction with the help of Arrhenius equations. How can you calculate activation energy ? 2

   (b) Explain Transition State theory of reaction rates with proper example. 2

8. (a) What is Autocatalysis and Heterogeneous catalysis ? 2

   (b) Explain *Michaelis-Menten* equation and explain how under different conditions the enzyme catalysed reaction can be of zero and first order with respect to substrate. 2

SECTION—E

9. (a) Differentiate $\left[\sqrt{x}+\frac{1}{\sqrt{x}}\right]^2$ w.r.t. x 1

   (b) Give the important properties of a catalyst. 1

   (c) What are the advantages of activated complex theory over collision theory ? 1

   (d) Differentiate between Rate Law and Law of mass action. 1

   (e) Define Boyle's temperature. How it is related to van der Waals constants ? 1

   (f) Differentiate between the term Population mean and Sample mean. 1