(i) Printed Pages : 3

(ii) Questions : 9

Roll No. .....

Sub. Code : 0 0 5 0

Exam. Code : 0 0 0 1

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

1125

CHEMISTRY (Same for B.Sc. Microbial & Food Tech.)

Paper—III : Physical Chemistry-A

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

Note :— Your have to attempt five questions in all, selecting one from each of Sections A, B, C & D. Section E is compulsory. Use of simple calculators is allowed.

SECTION—A

I. (a) If $x = 2^{\frac{-1}{3}\log_2 64}$ find value of x.

(b) If $z = \log (x^2 + y^2)$ find $\frac{dz}{dx}$ and $\frac{dz}{dy}$.

(c) Name the methods for improving accuracy of an analysis. 2,1,1

II. (a) What are determinate errors ? How can they be classified into different types ?

(b) Define standard deviation, average deviation and limit of a function. 2,2

SECTION—B

III. (a) Deduce the following gas laws from kinetic gas equation :

(i) Boyle's law

(ii) Charles' Law

(iii) Avogadro's Law.

(b) What are the units of VanderWaal's constants 'a' & 'b' ? Also write their significance. 2,2

IV. (a) Derive the following :

$$P_c V_c = \frac{3}{8} RT_c .$$

(b) Define Ideal and Real gases. Explain in terms of compressibility factor.

(c) Calculate :

(i) Root mean square speed and

(ii) Most probable speed of methane molecule at 27 °C.

1,1,2

SECTION—C

V. (a) Define the terms average rate and instantaneous rate of a reaction. How can you represent them ?

(b) Show that half life period of a Ist order reaction is independent of its initial concentration.

(c) For a first order reaction $t_{½}$ is 100 sec. How long will it take for the reaction to be 75% complete ? 1,1,2

VI. (a) Briefly explain different methods for the determination of order of a reaction.

(b) Derive an expression for rate constant for reactions of Ist order. Also write units of rate constant.

(c) Briefly differentiate molecularity and order of a reaction. 2,1,1

SECTION—D

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

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

VIII. (a) Define a chain reaction with example.

(b) Explain Michaelis Menton equation for Enzyme catalysis for Unimolecular reaction.

(c) What is Autocatalysis and Heterogenous catalysis ? 1,2,1

SECTION—E

(Compulsory)

IX. (a) Define threshold energy.

(b) Integrate $x^3 + 3x^2 - x + 5$ w.r.t. x.

(c) Define rate law.

(d) What is Boyle's temperature ?

(e) Define Mean Free Path.

(f) What is half life period of a reaction ? 6×1=6