SLR-ST – 3

Seat No.	

Set **P**

B.Sc. (Part – I) (Semester – I) Examination, 2018
CHEMISTRY (Paper – I) (CBCS Pattern)
Physical Chemistry

Day and Date : Saturday, 31-3-2018 Max. Marks : 70
Time : 10.30 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Draw ***neat*** *diagrams and give equations* ***wherever*** *necessary.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*
4) Use of logarithmic table and scientific calculator is ***allowed****.*
(At. Wts. : H = 1, C = 12, O = 16, N = 14, Na = 23 and Cl = 35.5)

1. Select the most correct alternative for **each** of the following : **14**

1) The equation, $t_{1/2} = 0.693/k$ represent the half life period of any
   a) First order reaction b) Second order reaction
   c) Zero order reaction d) Third order reaction

2) The curves representing variations of volume and pressure at constant temperature are called
   a) isobars b) isochores c) isotherms d) isotones

3) If initial concentration of reactants in certain reaction is doubled the half period of reaction remains same the order of reaction is
   a) Second order b) First order c) Zero order d) Third order

4) Ostwald's isolation method is used to determine the
   a) Order of a reaction b) Rate constant of a reaction
   c) Rate of a reaction d) None of these

5) Efficiency of heat engine, $\eta = 1$, if
   a) $T_2 = 0$ b) $T_1 = 0$ c) $T_2 - T_1 = 0$ d) $T_2 + T_1 = 0$

6) The slopes of lines parallel to each other are
   a) equal b) different c) zero d) one

7) For a reaction of n^{th} order, the velocity constant will be expressed in
   a) $(time)^{-1}.(Conc.)^{n-1}$ b) $(time)^{-1}.(Conc.)^{1-n}$
   c) $(time).(Conc.)^{n+1}$ d) $(time)^{-1}.(Conc.)^{1+n}$

8) The values on x-axis are called
   a) abscissa b) ordinate c) slope d) intercept

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9) In adiabatic process
   a) $q = 1$ b) $q \neq 0$ c) $q = 0$ d) $q \neq 1$

10) For chemical reaction _____ can never be fraction.
   a) Order b) Molecularity
   c) Both order and molecularity d) None of these

11) The derivative of a constant term is always
   a) Positive b) Negative c) Zero d) Constant

12) Reaction rates can change with
   a) Temperature b) Reactant concentrations
   c) Presence of catalyst d) All of these

13) The unit of 'b' in vander Waals equation is
   a) $dm^3.mol^{-1}$ b) $dm^3.mol.$ c) $dm^{-3}.mol$ d) None of these

14) The ideal gas equation for n moles is
   a) $PV = RT/n$ b) $PV = nRT$ c) $RT = nPV$ d) $PT = nRV$

2. Answer **any seven** of the following : **14**

i) Mention any four examples of spontaneous process.

ii) Mention various methods used for the determination of order of a reaction.

iii) What is isotherm ?

iv) Write any four rules of differentiation.

v) $k = \frac{x}{t.a(a-x)}$, using this equation, plot a graph of $\frac{1}{(a-x)}$ against 't', find the value of slope.

vi) Calculate % efficiency of heat engine operating between 400 K and 300 K.

vii) Define graph and graph paper.

viii) What are the causes of deviations of real gases from ideal behavior ?

ix) Write the reaction of hydrolysis of methyl acetate in presence of acid.

3. A) Answer **any two** of the following : **10**

i) What is slope ? Give its characteristics.

ii) Write a note on Joule-Thomson effect.

iii) A first order reaction is one half complete in 45 min. In how much time will it be 90% complete ?

B) Write a note on Carnot heat engine. **4**

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4. Answer **any two** of the following : **14**

   i) Discuss any three methods commonly used for determination of order of a chemical reaction.

   ii) Define the term intercept. Discuss different forms of straight line equation.

   iii) Derive vender Waal's equation for n moles of a gas.

   Tc and Pc for oxygen are, 154.4K and 5.131×10^6 N/m^2. Find the vander Waals constants 'a' and 'b' for oxygen if R = 8.31 J/K/mol.

5. Answer **any two** of the following : **14**

   i) What is velocity of a chemical reaction ? Discuss the factors which affect the rate of a chemical reaction.

   ii) What is thermodynamic efficiency ? Show that, $\frac{W}{q^2} = \frac{(T2 - T1)}{T2}$.

   iii) Discuss any three characteristics of second order reactions.

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