SLR-DK-193

Seat No.	

Set P

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Chemistry (Special Paper - XIII)
PHYSICAL CHEMISTRY

Day & Date: Monday, 07-10-2019 Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat diagrams and give equations wherever necessary.
4) Use of logarithmic tables and scientific calculator is allowed

Q.1 Fill in the blanks by choosing correct alternatives given below. **14**

1) The rotational spectra, the unit of constant B is_____.
   a) joules b) $joules^{-1}$
   c) cm^{-1} d) cm

2) Two solutions of different compositions co-existing with one another are called as _____ solutions.
   a) miscible b) true
   c) conjugate d) all of these

3) Reaction which proceeds in series of successive stages initiated by suitable primary processes are called _____.
   a) opposing reactions b) chain reactions
   c) consecutive reactions d) parallel reactions

4) For spontaneous process change in free energy is _____.
   a) positive b) negative
   c) both a & b d) all of these

5) The distance between two nearest troughs or crests is known as _____.
   a) frequency b) wave number
   c) wave length d) all of these

6) $\Delta A = \Delta G$, when_____.
   a) T is constant b) P is constant
   c) V is constant d) both P & T are constant

7) The ratio $\frac{K_2}{K_1}$ known as _____.
   a) rate of reaction b) order of reaction
   c) Temperature coefficient d) velocity constant

8) A solution contains 180 gm of glucose in 180 gm of water. The total number of moles of both solute and solvent in the solution will be _____.
   a) 1 b) 10
   c) 11 d) 21

9) In the formation of an ideal solution _____ is evolved or absorbed.
   a) heat b) light
   c) no heat d) none of these

10) In a reaction, 2A + B $\longrightarrow$ C + D. The molecularity of the reaction is _____.
   a) 2 b) 0
   c) 3 d) 1

11) Which of the following represents the relation between free energy change, enthalpy change and entropy change?
a) $\Delta G = \Delta H + T\Delta S$ b) $\Delta G - \Delta H = T\Delta S$
c) $\Delta G = \Delta H - T\Delta S$ d) $-\Delta H = \Delta G - T\Delta S$

12) The energy required for excitation is lowest for _____ transitions.
a) rotational b) vibrational
c) electronic d) all of these

13) For the reaction, $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ _____.
a) $Wmax = 2.303RT\ logKp - 2RT$ b) $Wmax = 2.303RT\ logKp$
c) $Wmax = 2.303RT\ logKp - RT$ d) $Wmax = 2.303RT\ logKp + RT$

14) The velocity constant of third order reaction is expressed in _____.
a) Sec^{-1} b) $dm^3.mol^{-1}.sec^{-1}$
c) $mol^{-2}(dm^3)^2.sec^{-1}$ d) min^{-1}

Q.2 A) Attempt any four of the following questions. **08**
1) What do you mean by electromagnetic spectrum?
2) State Raoult's law.
3) Define the term activity.
4) What is mean by consecutive or Successive reactions?
5) Define the term CST.

B) Write the short notes on (Any Two) **06**
1) Hot bands
2) Fugacity
3) Characteristic of third order reaction for graphical method

Q.3 A) Attempt any two of the following questions. **08**
1) Explain the nicotine- water system. What is the effect of impurities on CST values?
2) Derive Gibb's- Helmholtz equation.
3) Explain consecutive reaction with an example.

B) Attempt any one of the following questions. **06**
1) HCl shows an absorption band at the frequency of 8.67×10^{13} Hz. Calculate the force constant for HCl bond. (μ for $HCl = 1.628 \times 10^{-24}$gm.
2) Derive Clapeyron-Clausius equation.

Q.4 A) Attempt any two of the following questions. **10**
1) The vapour pressure of a liquid is 7.4×10^4 Pascal at 238k and $1.06x10^5$ Pascal at 293k. Calculate the molar heat of vaporization of liquid ($R = 8.314\ Jk^{-1}mol^{-1}$)
2) Derive Arrhenius equation.
3) Discuss the system with boiling point maximum.

B) Attempt any one of the following questions. **04**
1) Write the difference between ideal and non-ideal solutions.
2) Explain the term temperature coefficient.

Q.5 Attempt any two of the following questions. **14**
a) Explain in detail vibrational energies of diatomic molecules.
b) Derive van 't Hoff's equation.
c) Explain transition state theory. If the rate of reaction gets tripled from 298k to 318k. Calculate Ea (R = 8.368 joules).