

Rayat Shikshan Santha's
Rajarshi Chhatrapati Shahu College, Kolhapur

B.Sc. (Part-I, Sem-I) Preliminary Examination

Subject: Physical Chemistry (Paper-I)

Day and Date: Monday, 18th September, 2017

Marks: 50

Time: 12:00 to 02:00 pm

- Instructions:
1. All questions are compulsory
 2. Figures to the right indicate full marks
 3. Scientific calculator is allowed for calculations

Q.1. Select most correct alternative for each of the following and rewrite the sentences.

10 Marks

a) If there is of a solute in second solvent, the distribution law can be modified as, $K = C_1/C_2 (1-\alpha)$

- a) association b) dissociation
c) both a and b d) none of these

b) In case of cyclic process.....

- a) $q = -W$ b) $-q = W$
c) $\Delta E = W$ d) $q = W$

c) The reciprocal of decay constant of a radioelement is its.....

- a) average life b) half life
c) decay life d) both a and b

d) Efficiency of Carnot cycle is given by.....

- a) $\epsilon = W/T$ b) $\epsilon = T/W$
c) $\epsilon = W/q_2$ d) all of these

e) The parameter Z used to compare deviation of gases from ideal behavior is called.....

- a) Compressibility factor b) gas constant
c) critical constant d) decay constant

f) Van der Wall's constant 'a' has the dimensions of.....

- a) $L \text{ Mol}^{-1}$ b) Nm^{-2}
c) $\text{N m}^4 \text{ Mol}^{-1}$ d) m^3

g) The half life time of radioelement is 10^3 s, its decay constant is.....

- a) $6.93 \times 10^3 \text{ s}^{-1}$ b) $6.93 \times 10^{-4} \text{ s}^{-1}$
c) $6.93 \times 10^{-4} \text{ s}^{-1}$ d) $6.93 \times 10^{-2} \text{ s}^{-1}$

h) liquids are the liquids which are not completely soluble into each other.

- a) homogeneous b) heterogeneous
c) both a and b d) immiscible

i) The number of taking part in a chemical reaction is called molecularity of a reaction.

- a) molecules b) atoms
c) ions d) all of these

j) A device that converts heat continuously into work is called.....

- a) heat engine b) engine
c) hot engine d) cold engine

Q.2. Attempt the following. (any 2) 20 Marks

a) Define solvent extraction. Show that in the process of extraction, efficiency increases by the use of whole solvent in a number of portions than to use all at once.

b) Deduce, Van der Wall's equation which is applicable to real gases. Calculate Van der Wall's constants 'a' and 'b', if $T_c = 304 \text{ K}$, $P_c = 7.353 \times 10^6 \text{ Nm}^{-2}$ and $R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$.

c) Give stepwise derivation of Carnot cycle and its efficiency. Calculate efficiency of steam engine operates between 400 K and 773 K.

Q.3. Write short note. (any 4) 20 Marks

- a) Binding energy and mass defect
b) Andrew's isotherms
c) Mention applications of radioisotopes and explain carbon dating.
d) Second law of thermodynamics
e) Distribution law and its limitations
f) Carnot theorem