

CHE-503
Physical Chemistry

M.Sc. CHEMISTRY (MSCCH - 12/13/16/17)

First Year, Examination-2019

Time: 3 Hours

Max. Marks: 80

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Note:- This paper is of Eighty (80) marks divided into two (02) Section A and B. Attempt the question contained in these sections according to the detailed instructions given therein.

नोट:- यह प्रश्न-पत्र अस्सी (80) अंकों का है जो दो (02) खण्डों 'क' तथा 'ख' में विभाजित है। प्रत्येक खण्ड में दिए गए विस्तृत निर्देशों के अनुसार इन प्रश्नों को हल करना है।

Section-A (खण्ड-क)

(Long Answer Type Question) (दीर्घ उत्तरीय प्रश्न)

Note:- Section - A contains five (05) long answer-type questions of fifteen (15) marks each. Learners are required to answer any three (03) questions only. (3×15=45)

नोट:- खण्ड 'क' में पाँच (05) दीर्घ उत्तरीय प्रश्न दिये गये हैं।
प्रत्येक प्रश्न के लिए पन्द्रह (15) अंक निर्धारित हैं।
शिक्षार्थियों को इनमें से केवल तीन (03) प्रश्नों के उत्तर
देने हैं।

1. (a) Describe activated complex theory of reaction rates and compare it with collision theory of reaction rates.
(b) Discuss the kinetics of decomposition of ozone.
2. (a) Derive Schrodinger wave equation.
(b) Discuss the physical significances of entropy.
3. (a) Explain the concept of ionic atmosphere in Debye - Huckel's theory of strong electrolytes. Calculate the thickness of ionic atmosphere.
(b) Describe one important method for determining order of reaction.
4. (a) Describe third order reactions. Derive the rate expression for a third order reaction when initial concentration of all the reactants is same. Give unit of third order reactions.
(b) Derive two important forms of Gibbs - Helmholtz relation.

5. (a) Draw sketch of glass electrode and discuss its working.

(b) Establish the following relation for one mole of an ideal gas

$$ds = q \frac{dT}{T} + R \frac{dV}{V}$$

Section-B (खण्ड-ख)

(Short Answer Type Question) / (लघु उत्तरीय प्रश्न)

Note:- Section-B contains eight (08) short answer type questions of seven (07) marks each. Learners are required to answer any five (05) questions only. (5×7=35)

नोट:- खण्ड 'ख' में आठ (08) लघु उत्तरीय प्रश्न दिये गये हैं। प्रत्येक प्रश्न के लिए सात (07) अंक निर्धारित हैं। शिक्षार्थियों को इनमें से केवल पाँच (05) प्रश्नों के उत्तर देने हैं।

1. Write a note on operators.
2. Describe in brief the Carnot cycle and derive an expression for efficiency of Carnot engine.

3. Write a note on Van't Hoff reaction isotherm.
4. Giving two examples show how entropy increases in irreversible processes.
5. Write a note on Arrhenius equation and its important applications
6. Derive Gibbs – Duhem equation.
7. Explain clearly the difference between rate constant and rate of reaction with suitable examples.
8. Write short notes on the following
 - (a) Lambert – Bee's law
 - (b) Over voltage
