QK-5233

M. Sc. (Sem.-I) Examination, December-2023

CHEMISTRY

PAPER – 1.3

CHEM-513

Physical Chemistry

Time allowed : **Three Hours**

Maximum Marks : **70**
Min. Marks : **28**

*Note : This question paper contains **two** sections as under :*

Section-A ***Max. Marks-20***

This section will have 10 questions, having 02 questions from each unit with no internal choice. Answer in about 20 words. All questions carry equal marks. (10×02=20)

Section-B ***Max. Marks-50***

This section contains 10 questions, having 02 questions from each unit. one question to be attempted from each unit. Word limit approximately 400-500 words. Questions may have sub divisions. All questions will have equal marks. (10×05=50)

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SECTION - A

1 (i) Calculate the Dc Broglie wave length an object of mass 0.03 kg travelling with a velocity of 1.8 km sec^{-1}.

(ii) Write first and second postulate of Quantum mechanics.

(iii) Define angular momentum.

(iv) Define charge density.

(v) What is kinetic salt effect ?

(vi) What are the factors affecting enzyme catalyzed reactions.

(vii) Calculate the height does water rise at 25°C in a capillary tube of 1.00 mm diameter. The density of water is 997 kg m^{-3}. Assume that the contact angle is zero.

(viii) What is critical Micelle concentration ?

(ix) Explain fire resistant polymers.

(x) What are number average molecular weight and weight average molecular weight of macromolecular.

SECTION - B

UNIT - I

2 Discuss the application of Pesturbation theory to helium atom.

OR

Discuss the solution of Schrodinger equation for a particle in one dimensional box.

UNIT - II

3 Write note on :

(i) Eigen functions for angular momentum.

(ii) Eigen values of angular momentum.

OR

Calculate the electron density at each carbon atom in

(i) Ethylene

(ii) Butadiene

(iii) Cyclopropenyl radical

UNIT - III

4 Write notes on :

(i) Kinetic and thermodynamic control of reactions.

(ii) Collision theory of reaction rates.

OR

Give general features of fast reactions. Give various methods for study of fast reactions.

UNIT - IV

5 Write notes on :

(i) Pressure difference across curved surfaces

(ii) Catalytic activity at surfaces.

OR

Explain :

(i) Surface active agents and their classification.

(ii) Solubilization.

UNIT - V

6 Describe the various methods of molecular mass determination of macro molecules.

OR

Write short note on :

(i) Polymers and various types of polymers.

(ii) Chain configuration of macro molecules.

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