

M.Sc. (Previous) Examination, 2019

CHEMISTRY

Paper - III(CH-403)

(Physical Chemistry)

Time : 3 Hours

Maximum Marks : 100

- Note:** (i) No supplementary answer-book will be given to any candidate. Hence the candidates should write the answer precisely in the main answer-book only.
- (ii) All the parts of one question should be answered at one place in the answer book. One complete question should not be answered at different places in the answer book.
- (iii) Attempt five questions in all, selecting at least one question from each Unit. All questions carry equal marks.

1. Discuss perturbation theory. Derive an expression of perturbation theory to applying on Helium atom.

10+10

2. Write short notes on the following.

(i) Hamiltonian operator

(ii) Pauli's exclusion principle ✓

(iii) Extended Huckel theory ✓

(iv) Postulates of quantum mechanics

5×4

Unit-'II'

3. Explain fugacity. Derive an expression for determination of fugacity of a real gas. Also write any two applications of fugacity.

5+10+5

4. Write short notes on the following:

(i) Second order phase transitions

(ii) Lagrange's method of undetermined multipliers

(iii) Vibrational partition function

(iv) Onsagar's reciprocity relations

5×4

Unit-'III'

- 5 (a) Derive an rate expression for H_2 and Br_2 photochemical reaction. 15
- (b) Discuss kinetic and thermodynamic control of reaction. 5
6. Write short notes on any two of the following:
- (i) Primary kinetic salt effect
- (ii) Kinetics of pyrolysis of acetaldehyde
- (iii) Lindemann theory 10+10

Unit-'IV'

- 7 Write short notes on the following:
- (i) Kelvin equation
- (ii) Electro-Kinetic phenomenon
- (iii) Phase separation model of micellization
- (iv) Reverse micelles 5×4
- 8 (a) Write the kinetics of polymersation. 10
- (b) Discuss osmometry and viscometry method for molecular mass determination. 10

Unit-'V'

9. Write short notes on any two of the following :

10+10

- (i) Stern Model of electrified interface
- (ii) Effect of light at semiconductor solution interface
- (iii) Debye Huckel Jerum Mode.

10. (a) Derive an expression for Butler-Volmer equation.

5

10

(b) Discuss instrumentation and theory of polarography

10

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